Installation and operating instructions

Temperature difference controller
6 inputs, 3 outputs,
integrated data logger for SD card

These operating instructions are part of the product.

▶ Read these operating instructions carefully before use,
▶ keep them over the entire lifetime of the product,
▶ and pass them on to any future owner or user of this product.

EN

727.775 | Z02 | 08.10 | Subject to change due to technical improvements!

Content

Product information

EC declaration of conformity

"This product conforms to the applicable European directives with regard to its design and its operating behaviour. This conformity has been verified. Further information in this regard can be obtained from your dealer."

1 Safety

1.1 Proper usage

The temperature difference controller (hereinafter referred to as controller) is an independently installed electronic temperature controller for on-surface installation, and may only be used for controlling solar thermal systems within the permissible ambient conditions (see chapter 15 "Technical data").

The controller must not be operated in the following environments:

• outdoors

• in damp rooms

• in rooms where highly flammable gas mixtures can occur

• in rooms in which the operation of electrical and electronic components may cause dangers to arise

1.2 Dangers during assembly and commissioning

The following dangers exist during installation/commissioning of the controller and during operation (in case of installation errors):

• risk of death by electrocution

• risk of fire due to short-circuit

• damage to any of the constructional fire safety measures present in the building due to incorrectly installed cables

• damage to the controller and the connected devices due to improper ambient conditions, inappropriate power supply and the connection of prohibited devices, faulty devices, or devices not included in the device specifications, as well as incorrect assembly or installation

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NOTE

Observe the controller's type plate!

Therefore, all safety regulations apply when working on the mains supply. Only electricians may perform work that requires opening the controller (such as electrical connection work).

▶ When laying cables, ensure that no damage occurs to any of the constructional fire safety measures present in the building.

▶ Make sure that the permissible ambient conditions at the installation site are not exceeded (see chapter 15 "Technical data").

▶ Be sure to comply with the specified ingress protection.

▶ Labels and markings applied in the factory may not be altered, removed or rendered unreadable.

▶ Before connecting the device, make sure that the power supply matches the specifications on the type plate.

▶ Make sure that all devices which are connected to the controller conform to the technical data of the controller.

▶ Secure the device against unintentional start-up.

▶ All work on an open controller must be performed with the mains supply removed.

▶ Protect the controller against overloading and short-circuiting.

1.3 Detecting faults

▶ Check the display regularly.

▶ In case of faults, isolate the cause (see chapter 11.1 "Causes of problems").

▶ As soon as it becomes evident that safe operation is no longer guaranteed (e.g. visible damage), remove the device from the mains supply immediately.

▶ Have trained professional personnel remedy the fault.

1.4 Hot water temperature

In order to limit the hot water temperature to 60 °C at the outlets, a hot water mixer must be installed.

1.5 Disposal

▶ Dispose of the controller in accordance with the regional regulations.

1.6 Exclusion of liability

The manufacturer can neither monitor the compliance with this manual nor the conditions and methods during the installation, operation, usage and maintenance of the controller. Improper installation of the system may result in damage to property and, as a result, to bodily injury.

Therefore, the manufacturer assumes no responsibility and liability for loss, damage or costs which result from or are in any way related to incorrect installation, improper operation, incorrect execution of installation work and incorrect usage and maintenance.

Similarly, we assume no responsibility for patent right or other right infringements of third parties caused by usage of this controller.

The manufacturer reserves the right to make changes to the product, technical data or installation and operating instructions without prior notice.

2 Case overview

Display
Display for controller operation and system settings

Operating switch

The following modes of operation can be selected:

- **Manual**
  for commissioning and testing for function

- **Automatic**
  for automatic operation

- **Off**
  for switching off the outputs

Operating buttons

Arrow up
for scrolling up through the menus

SET button
confirmation or activation of a value

ESC button
escape key

Arrow down
for scrolling down through the menus

◄ **Manual**
◄ **Automatic**
◄ **Off**

*Fuses
(see chapter 15)*

*Replacement fuses
(see chapter 15)*

Power connection

Outputs   *Inputs*   *Strain relief*   *RS232 and RS485 interface,
alarm output,
Direct Sensor output*

SD card
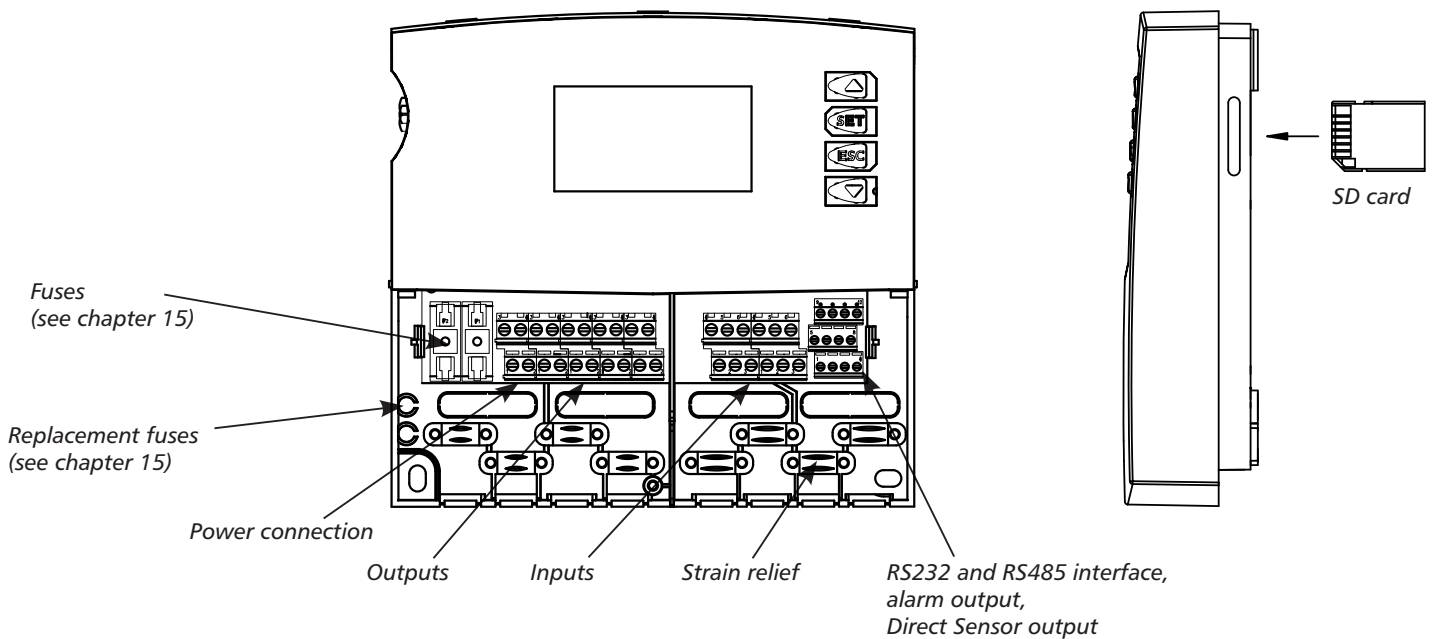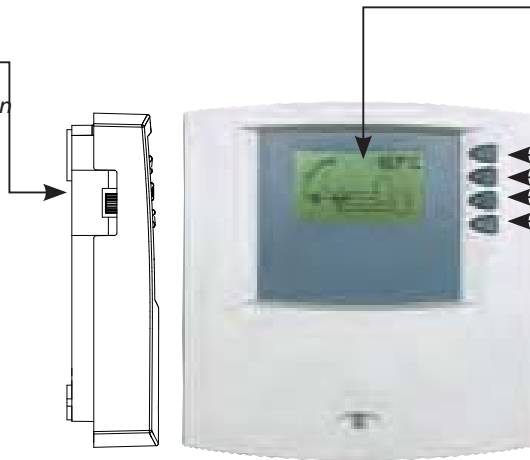
3 About this manual

3.1 Applicability

This manual describes the installation, commissioning, operation, maintenance and dismantling of the temperature differential controller for solar thermal energy systems. When installing the remaining components, e.g. solar collectors, pump assemblies, storage units, pumps and switching valves, be sure to observe the appropriate installation instructions provided by each manufacturer.

3.2 Users

Installation, commissioning, maintenance and dismantling of the controller may only be performed by trained professional personnel. Before commissioning, the controller must be professionally assembled and installed by professional personnel in accordance with the applicable regional and transregional regulations as well as the safety instructions and general instructions within these installation and operating instructions. The professional personnel must be familiar with these operating instructions.

The controller is maintenance-free.

Use the controller only after first thoroughly reading and understanding these operating instructions and the safety instructions. Adhere to all safety instructions and consult professional personnel in the event of any ambiguities.

This device is not intended for persons (or children) with physical, sensory, or mental disabilities, or who have inadequate experience and knowledge, unless they are instructed in the use of the device, and initially supervised, by a person responsible for their safety. Children should not be left alone with the device, to ensure that they do not play with it.

3.3 Description of symbols

3.3.1 The structure of the warning notices

⚠ SIGNAL WORD

Type, source and consequences of the danger!

▶ Measures for avoiding danger.

3.3.2 Danger levels in warning notices

Danger level	Likelihood of occurrence	Consequences resulting from non-compliance
⚠ DANGER	Imminent threat of danger	Death, serious bodily injury
⚠ WARNING	Possible threat of danger	Death, serious bodily injury
⚠ CAUTION	Possible threat of danger	Minor bodily injury
CAUTION	Possible threat of danger	Property damage

3.3.3 Note

NOTE

Note on easier and safer working habits.

▶ Measures for easier and safer working habits.

3.3.4   Other symbols and markings

Symbol	Meaning
✓	Condition for action
▶	Call to action
⇨	Result of action
•	List
Emphasis on issue at hand	Emphasis on issue at hand
△▽:	Press „Arrow up/down" for scrolling.
▽:	Press „Arrow down" for scrolling through the menu or to adjust a value.
△:	Press „Arrow up" for scrolling through the menu or to adjust a value.
SET:	Press „SET" button to confirm or activate a value.
ESC:	Press „ESC" button to cancel.

4   Installation

4.1   Opening/closing the housing

⚠ DANGER

Risk of death by electrocution!

▶ Remove the controller from the power supply before opening the case.

▶ Make sure that the power supply cannot be unintentionally switched back on.

▶ Do not damage the case.

▶ Only switch the power supply back on after the case has been closed.

The upper case is connected to the lower case by two latches, and fastened with a screw.

4.1.1   Opening the case

▶ Loosen the screw and remove the upper case in an upwards direction.

4.1.2   Closing the case

▶ Place the upper case over the lower case at an angle. Insert the latches into the recesses of the lower case.

▶ Pivot the upper case down and feed the operating buttons through the matching holes.

▶ Fasten the case tightly with the screw.

Latch

Operating buttons

Upper casing

Lower case

Screw
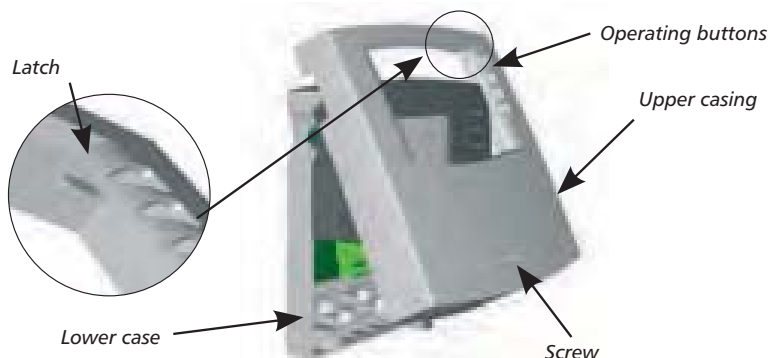
4.2   Assembly

⚠ WARNING

Risk of electrical shock and fire if mounted in a damp environment!

▶ Only mount the controller in an area where the ingress protection is sufficient (see chapter 15 "Technical data").
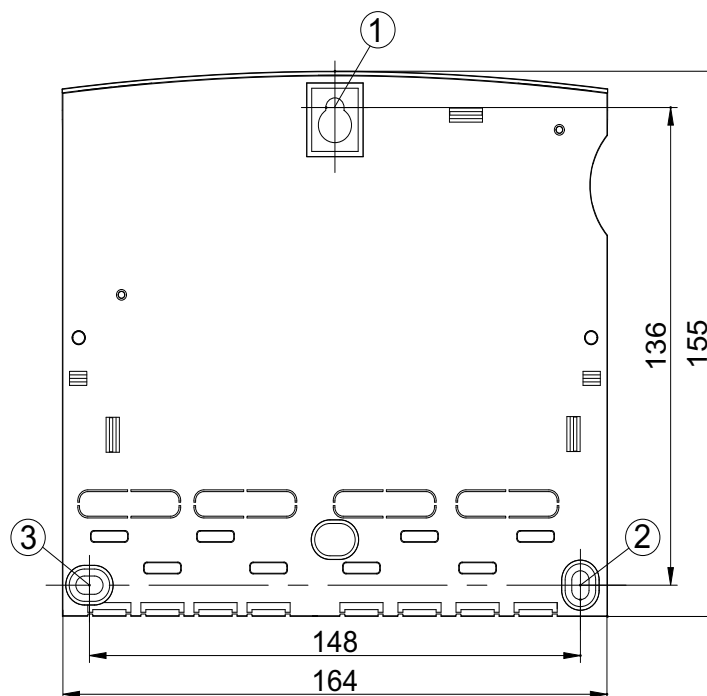
4.2.1   Mounting the controller

⚠ CAUTION

Risk of injury and damage to the case when drilling!

▶ Do not use the case as a drilling template.

▶ Choose a suitable installation site.
▶ Drill the upper fastening hole.
▶ Screw in the screw.
▶ Remove the upper case.
▶ Hang the case in the recess ①.
▶ Mark the position of the lower fastening holes ②,③.
▶ Remove the case again.
▶ Drill the lower fastening holes.
▶ Hang the case in recess ①.
▶ Screw the case firmly using the lower fastening holes ② and ③.
▶ Mount the upper case.

4.3 Electrical connection

⚠ DANGER

Risk of death by electrocution!

▶ Remove the controller from the power supply before opening the case.

▶ Observe all applicable legal guidelines and regulations of the local electricity supplier.

NOTE

The device is to be connected to the mains by means of a plug with grounding contact, or in the case of a fixed electrical installation, via a disconnection device for complete disconnection in accordance with the installation guidelines.

4.3.1 Preparing the cable feed

Depending on how the controller is mounted, the cables may enter the device through the rear of the case ④ or the lower side ⑤ of the case.
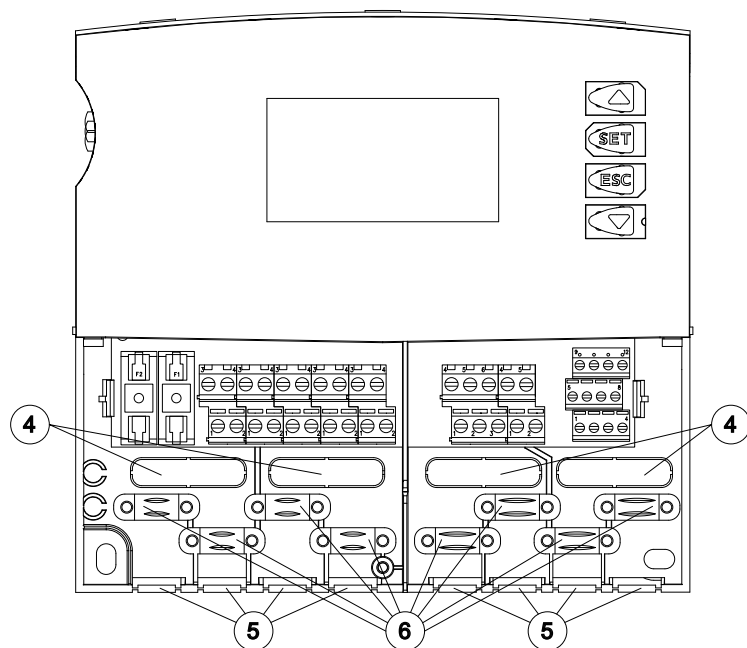
Feeding the cable through the rear of the case:

▶ Remove the plastic flaps ④ from the rear side of the case using an appropriate tool.

⚠ WARNING

Risk of electrical shock and fire due to cables coming loose!

▶ Install an external strain relief for the cables.

Feeding the cable through the lower side of the case:

▶ Use an appropriate tool to cut the plastic flaps ⑤ at the left and the right and break them out of the case.

▶ Fasten cable at position ⑥ with the provided plastic links.

4.3.2   Connecting the cables

▶ If a protective conductor is provided or required for pumps/valves, connect it to the corresponding terminals of the controller. When connecting the protective conductor, observe the following points:

- Make sure that the protective conductor is also connected to the controller's mains supply side.
- Each terminal may only be connected to a single connecting wire (max 2.5 mm^2).

▶ The terminal screws are approved for connection of cables as follows:

- single wire (solid): $\leq$ 2.5 mm^2
- fine strand (with core end sleeves): $\leq$ 1.5 mm^2

▶ Only use the original temperature sensors (Pt1000) that are approved for use with the controller.

▶ Observe the following points:

- The polarity of the temperature sensor contacts is not important.
- Do not lay sensor cables close to power cables (minimum separation: 100 mm).
- If inductive effects are expected, e.g. from power cables, overhead wires, transformer substations, radio and television devices, amateur radio stations, microwave devices, etc., the sensor cables must be adequately screened.
- Sensor cables may be extended to a maximum length of 100 m.

▶ If adding extensions to sensor cables, select the following cable cross sections:

- 0.75 mm^2 up to 50 m long
- 1.5 mm^2 up to 100 m long

▶ Connect the cables in accordance with the terminal diagram (see chapters 4.5 and 7.2)

4.4   Dismantling

⚠ DANGER

Risk of death by electrocution!

▶ Remove the controller from the power supply before dismantling it.

▶ To dismantle the controller, follow the assembly instructions in the reverse order.

4.5 Terminal diagram

4.5.1 Power connection

- Please refer to the type plate on the case to determine the type of power supply required
- The protective conductor must be connected
- Cables conforming to at least type H05 VV-... (NYM…) must be used

G1: grid
D1: wire bridge

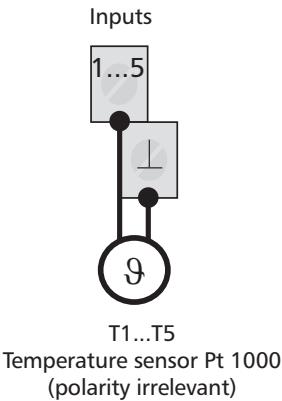| N	L	N	R1	N	R2	N	n.c	n.c.	R3
⏚	⏚	⏚	⏚	n.c.	L	L	n.c.	n.c.	X

G1

230 V ~
115 V ~

D1
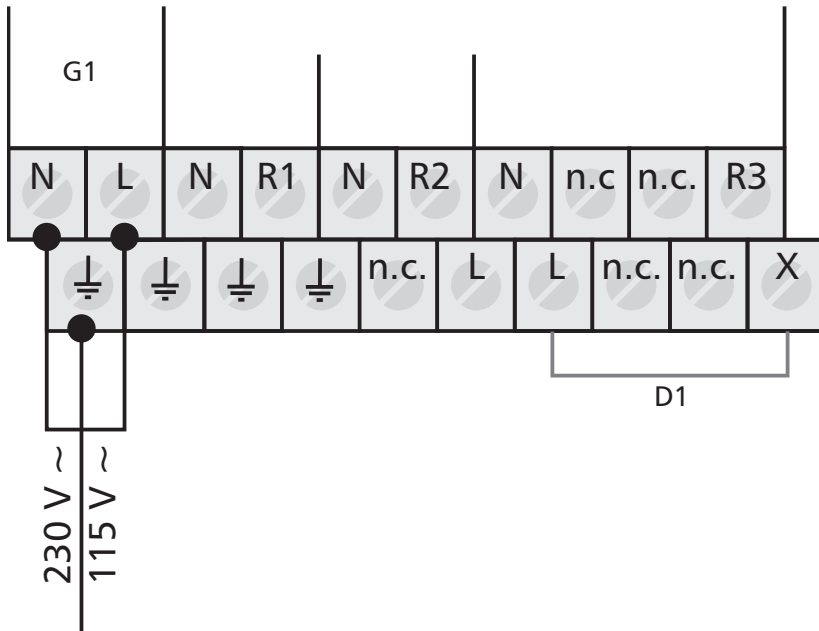
4.5.2 Connection of the inputs

- Inputs 1 - 5: for Pt1000 temperature sensor
- Input 6: for Pt1000 temperature sensor or pulse generator for recording volume flow (measuring heat quantities)
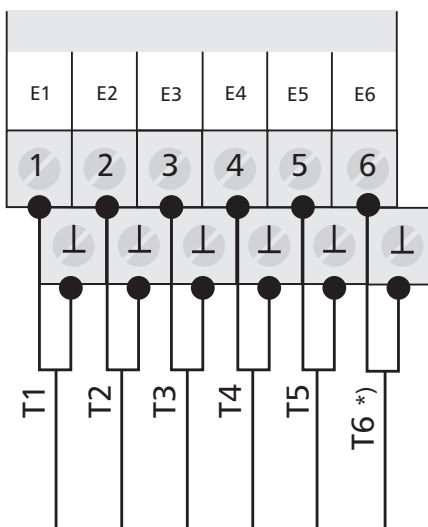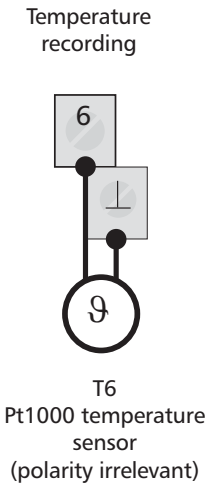
E1: input 1
E2: input 2
E3: input 3
E4: input 4
E5: input 5
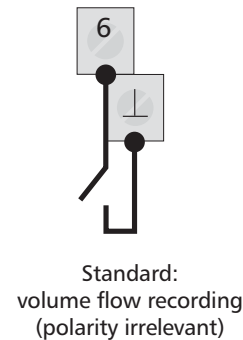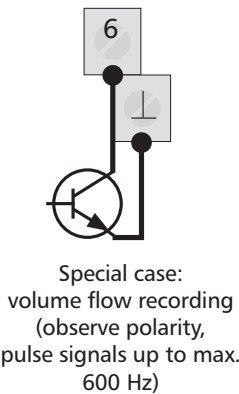E6: input 6
T6 *): T6 or pulse generator

E1	E2	E3	E4	E5	E6
1	2	3	4	5	6
⏚	⏚	⏚	⏚	⏚	⏚

T1 T2 T3 T4 T5 T6 *)

Inputs 1 - 5: temperature recording

Inputs

1…5

⊥

ϑ

T1...T5
Temperature sensor Pt 1000
(polarity irrelevant)

Input 6: recording temperatures and pulse values

Temperature
recording

6

⊥

ϑ

T6
Pt1000 temperature
sensor
(polarity irrelevant)

Recording pulse values
via reed relay

6

⊥

Standard:
volume flow recording
(polarity irrelevant)

Recording pulse values
via open collector

6

⊥

Special case:
volume flow recording
(observe polarity,
pulse signals up to max.
600 Hz)

### 4.5.3   Connection of outputs R1, R2 and R3

Outputs R1 and R2:

• Semiconductor relays (TRIAC), also suitable for RPM control; max. switching current: see type plate

CAUTION

Avoiding damage and malfunctions

▶ When connecting an external relay or contactor, or when connecting a pump which has its own electronic RPM control, the controller output's RPM control must be deactivated (see chapter 7.4.3 "Setting the RPM control parameters").
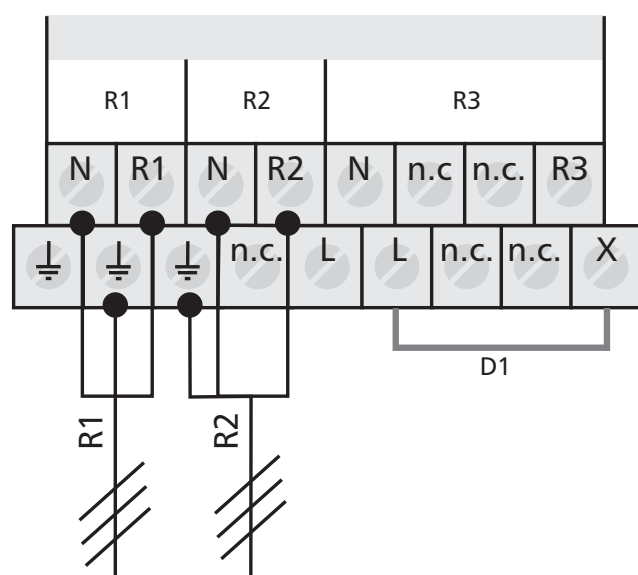
R1: output 1
R2: output 2
R3: output 3
D1: wire bridge

Output R3: switched output or potential-free output

• 230 VAC switched output (option: 115 VAC) via electromechanical relay; max. switching current: see type plate; wire bridge must be connected!
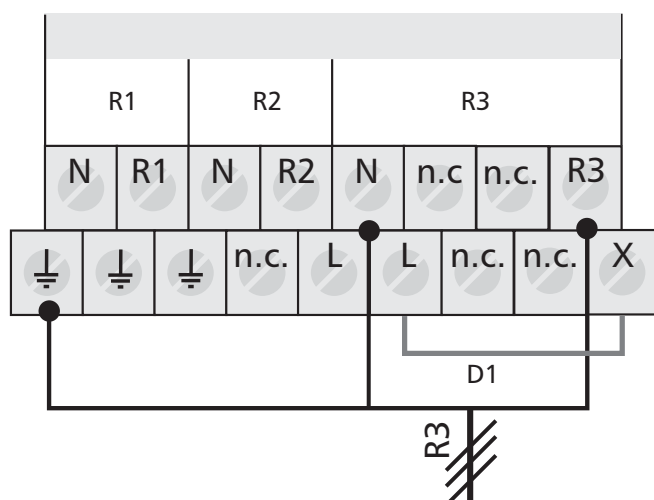
R1: output 1
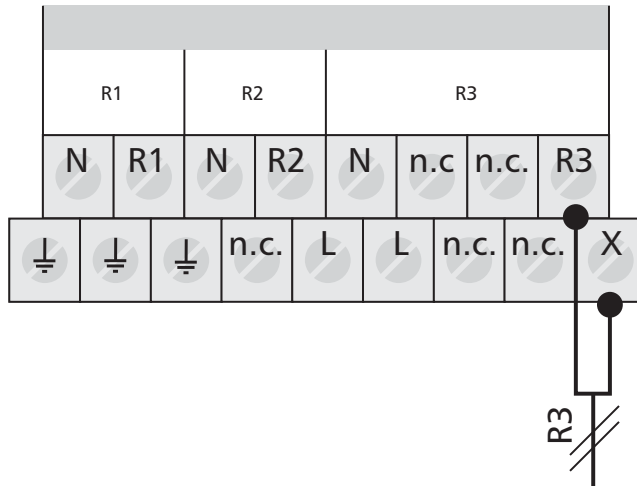R2: output 2
R3: output 3
D1: wire bridge

- Potential-free output via electromechanical relay; wire bridge must be removed!
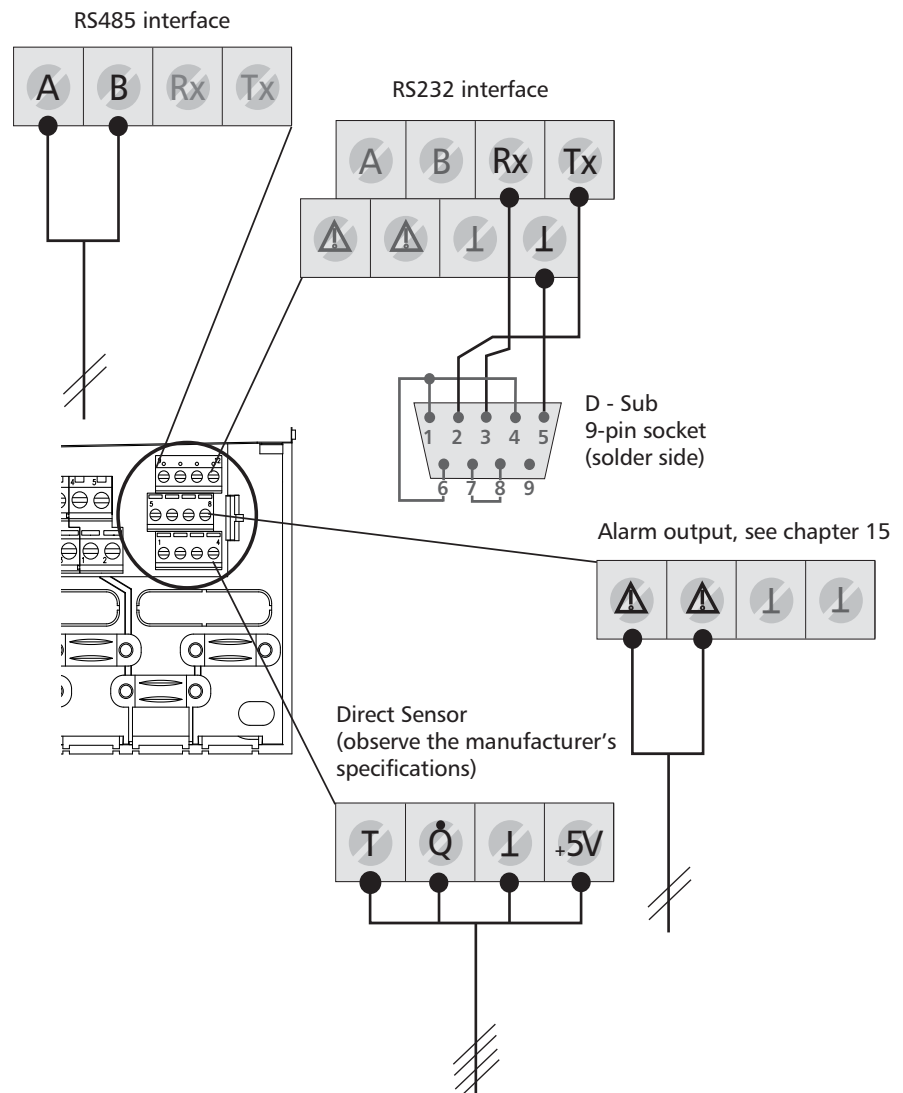
⚠ DANGER

Risk of death by electrocution!

▶ In the event of use as a potential-free output, it must be ensured that the connections cannot come into contact with the mains voltage.

R1: output 1
R2: output 2
R3: output 3

4.5.4   RS232 and RS485 interface, alarm output, and Direct Sensor input

RS485 interface

RS232 interface

D - Sub
9-pin socket
(solder side)

Alarm output, see chapter 15

Direct Sensor
(observe the manufacturer's specifications)

5   Commissioning

▶ Make sure that the installation is finished completely and correctly, and that the switch on the controller is set to "OFF".

  ⇨ *The display for setting the language appears.*

5.1   Setting the language

✓ *"Deutsch" flashes in the display.*

▶ △▽: select a language.

▶ **SET:** confirm the language.

▶ **ESC:** finish the settings.

  ⇨ *The display for setting the time appears.*

Display: 6.1

[Deutsch]

5.2   Setting the time and date

✓ *"12:00" flashes in the display.*

▶ △▽: set the hours.

▶ **SET:** confirm the hours.

  ⇨ *The minutes display flashes.*

▶ △▽: set the minutes.

▶ **SET:** confirm the minutes.

  ⇨ *The year flashes.*

▶ △▽: set the year.

▶ **SET:** confirm the year.

  ⇨ *The month flashes.*

▶ △▽: set the month.

▶ **SET:** confirm the month.

  ⇨ *The day flashes.*

▶ △▽: set the day.

▶ **SET:** confirm the day.

▶ **ESC:** finish the settings.

  ⇨ *Display for activating the "automatic summer time change-over" appears.*
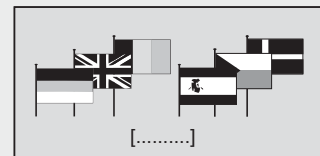

Display: 1.1

5.3   Setting the automatic summer time

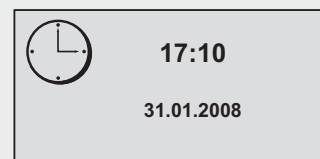✓ *Display for "automatic summer time change-over" appears.*

NOTE

The controller can also be operated without activating the "automatic summer time change-over".

Automatic summer time change-over (for EU)

▶ **SET:** press button.

  ⇨ *"automatic summer time change-over" is activated.*

▶ **ESC:** finish the settings.
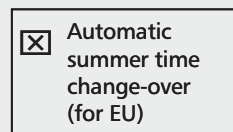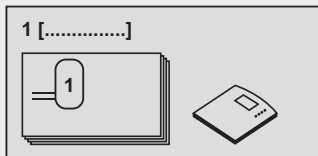
  ⇨ *The display for setting the system group appears.*

Display: 2.1

[Storage tank]
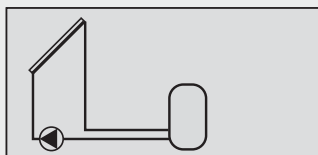

Display: 2.1.1

5.4 Setting the system group

NOTE

For an overview of systems, see chapter 7.2 "Systems".

✓ *The first system group (1 storage tank system) appears in the display.*

▶ △▽: select a system group.

▶ **SET:** confirm the system group.

⇨ *The display for setting the system appears.*

5.5 Setting the system

✓ *The first system in the selected system group appears in the display.*

▶ △▽: selecting a system.

▶ **SET:** confirm the system.

⇨ *In the display, a small checkmark appears below the item number, which confirms that the system is selected.*

▶ **ESC:** exit the settings menu.

⇨ *The commissioning is finished.*

6 Modes of operation

6.1 "OFF" mode

▶ In order to switch off the outputs, slide the operating switch down.
   ⇨ *A new window appears in the display, which shows "OFF", as well as the controller software version number and the number of the chosen system. The display is lit with a red background.*

In "OFF" mode, all outputs (R1, R2, R3) are switched off.

NOTE

On delivery from the manufacturer, the switch is set to "OFF".

OFF
Version: XX System No.: X

off

6.2 "Automatic" mode

CAUTION

Damage to pump caused by dry operation!

The controller may only be set to "Automatic" when the system has been filled.

▶ In order to switch the outputs to "Automatic", slide the operating switch to the middle position.
   ⇨ *The status appears in the display.*

This mode of operation is the automatic controller mode and must be set for automatic operation.

NOTE

▶ During normal system operation, the operating switch should always be set to "Automatic".

❶   - 1°C
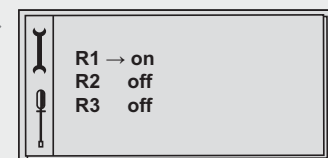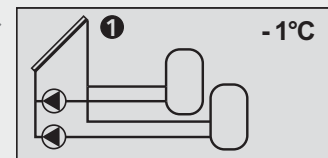
Automatic

6.3 "Manual" mode

CAUTION

Damage to pump caused by dry operation!

The controller may only be set to "Manual" when the system has been filled.

When operating the device for the first time, or when testing the function, the controller outputs can be manually switched.

▶ In order to switch the outputs manually, slide the operating switch up.
   ⇨ *The display is backlit in red and a settings window is displayed.*
▶ △▽: selecting an output.
▶ **SET:** switch the selected output to "on" or "off".
▶ **ESC:** close the settings window.
   ⇨ *The current recorded values can now also be queried for the purpose of checking.*
▶ △▽: access measured values.
▶ **SET:** reopen the settings window.

R1 → on
R2   off
R3   off

Manual
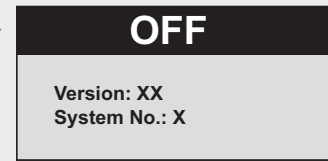
7   Settings

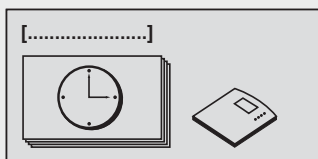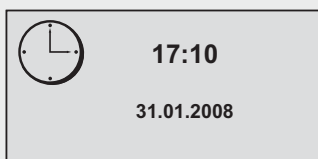**Menu overview, see following double page**

7.1   Time/date

The time and date can be displayed and adjusted via the "Time/Date" menu item. The automatic summer time change-over can still be activated or deactivated.

7.1.1   Setting the time and date

[....................]

Display: 1
[Time/date]

▶ **SET:** press button for approx. 2 sec.
   ⇨ *The "Time" menu item is displayed.*
▶ **SET:** press button.
   ⇨ *The current time is displayed.*
▶ **SET:** press button to confirm.
   ⇨ *The hours display flashes after confirmation of the time.*

17:10

31.01.2008

Display: 1.1

▶ △▽: set the hours.
▶ **SET:** press button to confirm.
   ⇨ *The minutes display flashes after confirmation of the hours.*
▶ △▽: set the minutes.
▶ **SET:** press button to confirm.
   ⇨ *The year display flashes after confirmation of the minutes.*
▶ △▽: set the year.
▶ **SET:** press button to confirm.
   ⇨ *The month display flashes after confirmation of the year.*
▶ △▽: set the month.
▶ **SET:** press button to confirm.
   ⇨ *The day display flashes after confirmation of the month.*
▶ △▽: set the day.
▶ **SET:** confirm the time and date.

7.1.2   Activating the automatic summer time change-over

▶ △▽: press button.
   ⇨ *The display for "Automatic summer time change-over (for EU)" appears.*

☒ Automatic summer time change-over (for EU)

▶ **SET:** press to activate or deactivate the automatic summer time change-over.
   ⇨ *A cross in the control box shows that the automatic summer time change-over is active.*
▶ **ESC:** exit the "automatic summer time change-over" submenu.
▶ **ESC:** exit the "Time/Date" menu item.

NOTE

The controller can also be operated without activating the "automatic summer time change-over".

Menu overview

| Status display |

Set season	Time	Systems

The menu item "Set season" is only displayed if a seasonal system has been selected.

1 storage tank systems	2 storage tanks systems	3 storage tanks systems	Swimming pool systems	S torage tank swimming pool systems
System 1	System 12	System 21	System 23	System 29
System 2	System 13	System 22	System 24	System 30
System 3	System 14		System 25	System 31
System 4	System 15		System 26	System 32
System 5	System 16		System 27	
System 6	System 17		System 28	
System 7	System 18			
System 8	System 19			
System 9	System 20			
System 10				
System 11				

```
                                                    ┌──────────┬──────────┬──────────┬──────────┐
                                              Functions  Parameters  Storage priority  Language  Factory settings
```

- 2 storage tanks swimming pool systems
  - System 33
  - System 34

- Seasonal systems
  - System 35
  - System 36
  - System 37
  - System 38
  - System 39
  - System 40

- Functions
  - Circulation
  - Back-up heating
  - Solid fuel boiler
  - Quick charge
  - Bypass
  - Heat quantity
  - Thermostat
  - Difference thermostat
  - Time function
  - Interval
  - Stagnation reduction
  - Holiday/recooling function
  - Frost protection
  - Anti-legionella function
  - Display storage tank top
  - Data logger
  - Alarm output

- Parameters
  - Max. temperature storage tank 1
  - Max. temperature storage tank 2
  - Max. temperature storage tank 3
  - Max. temperature swimming pool
  - Switch-on temp. difference solar 1
  - Switch-off temp. difference solar 1
  - Switch-on temp. difference solar 2
  - Switch-off temp. difference solar 2
  - Max. collector temperature
  - Min. collector temperature
  - Switch-on temperature difference return increase
  - Switch-off temperature difference return increase
  - Max. temperature loading circuit 1
  - Min. temperature loading circuit 1
  - Max. temperature loading circuit 2
  - Min. temperature loading circuit 2
  - Loading strategy storage tank 1
  - Loading strategy storage tank 2
  - Loading strategy storage tank 3
  - RPM control pump R1
  - RPM control pump R2

- Storage priority
- Language
- Factory settings

7.2 Systems

The desired solar energy system can be chosen using the "Systems" submenu. There are a total of 40 different systems to choose from (subdivided into 7 system groups).

System group	40 systems	Chapter
Systems with one storage tank	System 1: 1 collector array – 1 storage tank	7.2.1
	System 2: 1 collector array – 1 storage tank – heating return increase	
	System 3: 1 collector array – 1 storage tank with external heat exchanger	
	System 4: 1 collector array – 1 storage tank with external heat exchanger – heating return increase	
	System 5: 1 collector array – 1 storage tank with zone loading	
	System 6: 1 collector array – 1 storage tank with zone loading – heating return increase	
	System 7: 1 collector array – 1 storage tank with zone loading and external heat exchanger	
	System 8: 2 collector arrays (east/west roof) – 1 storage tank	
	System 9: 2 collector arrays (east/west roof) – 1 storage tank - heating return increase	
	System 10: 2 collector arrays (east/west roof) - 1 storage tank with external heat exchanger	
	System 11: 2 collector arrays (east/west roof) – 1 storage tank with zone loading	
Systems with two storage tanks	System 12: 1 collector array – 2 storage tanks – intelligent pump control	7.2.2
	System 13: 1 collector array – 2 storage tanks – heating return increase – intelligent pump control	
	System 14: 1 collector array – 2 storage tanks – intelligent valve control	
	System 15: 1 collector array – 2 storage tanks – heating return increase – intelligent valve control	
	System 16: 1 collector array – 1 storage tank – 1 storage tank with external heat exchanger – intelligent pump control	
	System 17: 1 collector array – 1 storage tank – 1 storage tank with external heat exchanger – intelligent valve control	
	System 18: 1 collector array – 2 storage tanks with external heat exchanger – intelligent pump control	
	System 19: 1 collector array – 2 storage tanks with external heat exchanger – intelligent valve control	
	System 20: 2 collector arrays (east/west roof) – 2 storage tanks	

| System group	40 systems	Chapter
Systems with three storage tanks	System 21: 1 collector array – 3 storage tanks – intelligent pump control	7.2.3
	System 22: 1 collector array – 3 storage tanks – intelligent valve control	
Systems with a swimming pool	System 23: 1 collector array – 1 swimming pool	7.2.4
	System 24: 1 collector array – 1 swimming pool with external heat exchanger	
	System 25: 1 collector array – 1 swimming pool in stand-alone operation with external heat exchanger	
	System 26: 2 collector arrays (east/west roof) – 1 swimming pool	
	System 27: 2 collector arrays (east/west roof) - 1 swimming pool with external heat exchanger	
	System 28: 2 collector arrays (east/west roof) – 1 swimming pool in stand-alone operation with external heat exchanger	
Systems with one storage tank and a swimming pool	System 29: 1 collector array – 1 storage tank – 1 swimming pool with external heat exchanger – intelligent pump control	7.2.5
	System 30: 1 collector array – 1 storage tank – 1 swimming pool with external heat exchanger – intelligent valve control	
	System 31: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control	
	System 32: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control	
Systems with two storage tanks and a swimming pool	System 33: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control	7.2.6
	System 34: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control	
Seasonal systems	System 35: 1 collector array – 1 storage tank – 1 swimming pool with external heat exchanger – intelligent pump control	7.2.7
	System 36: 1 collector array – 1 storage tank – 1 swimming pool with external heat exchanger – intelligent valve control	
	System 37: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control	
	System 38: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control	
	System 39: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control	
	System 40: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control	

NOTE

Upon selection of a new system, the functions, storage tank priority, and parameters are automatically returned to their factory settings.

▶ Check the settings again!

Selecting a system

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select the menu item "Systems".
▶ **SET:** open the submenu "System groups".
▶ △▽: select a system group.
▶ **SET:** press button to confirm.
▶ △▽: selecting a system.
▶ **SET:** press button to confirm.

⇨ *In the display, a small checkmark appears below the item number, which confirms that the system is selected.*

▶ **ESC:** exit the "Systems" menu item.

[.................]
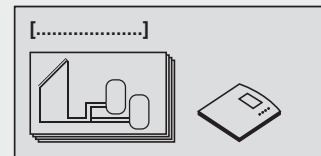
Display: 2
[Systems]
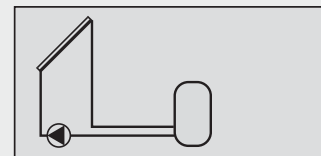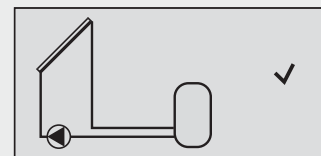
Display example

Display example

1 [...............]

1
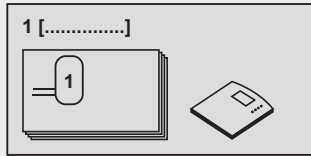
Display: 2.1
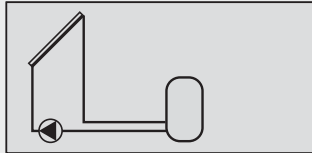
[Storage tank]

Display: 2.1.1

A1: collector array
B1: storage tank
D1: wire bridge
R1: solar circuit pump
T1: collector sensor
T2: sensor at bottom of
     storage tank

7.2.1   Systems with one storage tank

System 1: 1 collector array – 1 storage tank

Description of the solar function: the solar circuit pump R1 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or a safety limit is reached, the solar circuit pump R1 is switched off again.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").
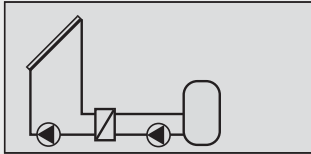
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

System 2: 1 collector array – 1 storage tank – heating return increase

Description of the solar function: the solar circuit pump R1 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or a safety limit is reached, the solar circuit pump R1 is switched off again.

Description of the heating return increase: the 3-way valve R2 in the heating return is switched on (water flows through storage tank) as soon as the switch-on temperature difference between the storage tank B1 (T3) and the heating return (T4) is reached. When the switch-off temperature difference (T3 – T4) is reached, the 3-way valve R2 returns to its initial state. Water does not flow through the storage tank.

NOTE

When no voltage is on the system, the switching valve R2 must be set in such a manner that water does **not** flow through the storage tank.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout
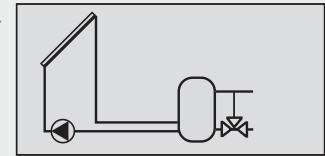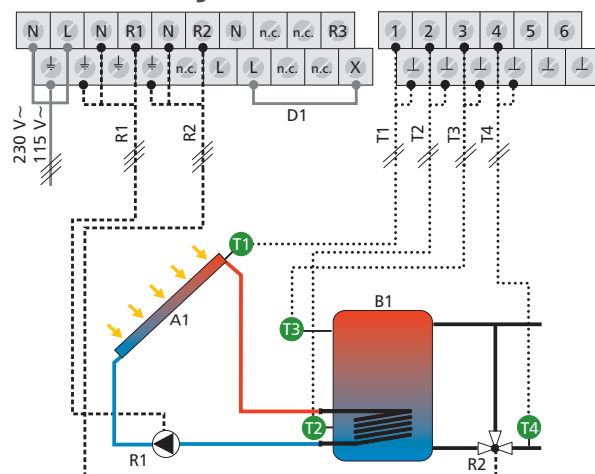
Display: 2.1.2

A1: collector array
B1: storage tank
D1: wire bridge
R1: solar circuit pump
R2: switching valve
    heating return increase
T1: collector sensor
T2: sensor at bottom of storage
    tank
T3: heating return increase
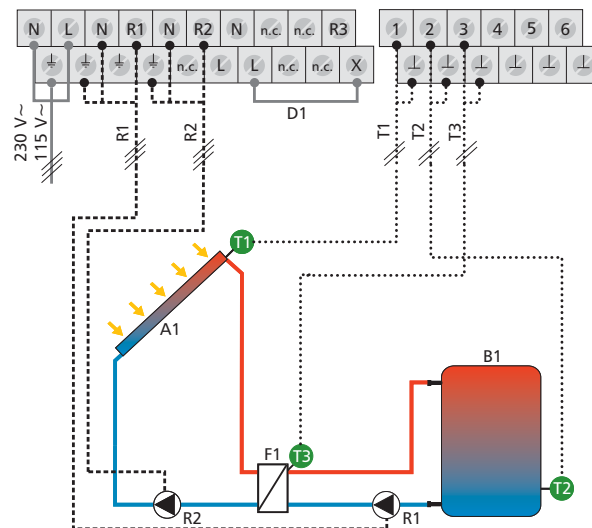   storage tank sensor
T4: heating return sensor

Display: 2.1.3

A1: collector array
B1: storage tank
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading
    pump
R2: solar circuit pump
T1: collector sensor
T2: sensor at bottom of
    storage tank
T3: external heat exchanger
    sensor

System 3: 1 collector array –
1 storage tank with external heat exchanger

Description of the solar function: the solar circuit pump R2 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference or a safety limit is reached, the solar circuit pump R2 switches off. The storage tank loading pump R1 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T3) and the storage tank B1 (T2) is reached. The storage tank is loaded until the switch-off temperature difference between the external heat exchanger F1 (T3) and the storage tank B1 (T2) is reached, or until a safety limit is reached.

Loading strategy of storage tank loading pump R1 and solar circuit pump R2: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

System 4: 1 collector array – 1 storage tank with external heat exchanger – heating return increase

Description of the solar function: the solar circuit pump R2 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference or a safety limit is reached, the solar circuit pump R2 switches off. The storage tank loading pump R1 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the storage tank B1 (T2) is reached. The storage tank is loaded until the switch-off temperature difference between the external heat exchanger F1 (T4) and the storage tank B1 (T2) is reached, or until a safety limit is reached.

Description of the heating return increase: the 3-way valve R3 in the heating return is switched on (water flows through storage tank) as soon as the switch-on temperature difference between the storage tank B1 (T3) and the heating return (T5) is reached. When the switch-off temperature difference (T3 – T5) is reached, the 3-way valve R3 returns to its initial state. Water does not flow through the storage tank.

NOTE

When no voltage is on the system, the switching valve R3 must be set in such a manner that water does **not** flow through the storage tank.

Loading strategy of storage tank loading pump R1 and solar circuit pump R2: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout
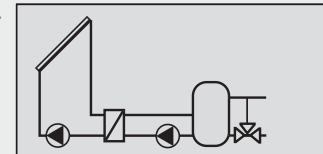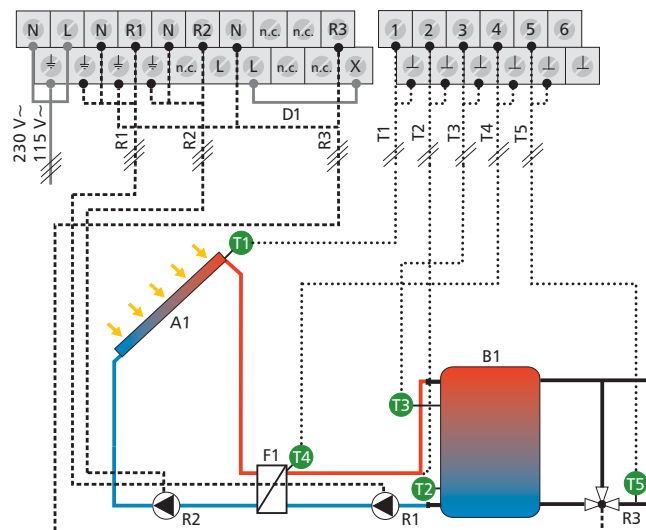
Display: 2.1.4

A1: collector array
B1: storage tank
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump
R2: solar circuit pump
R3: heating return increase switching valve
T1: collector sensor
T2: sensor at bottom of storage tank
T3: heating return increase storage tank sensor
T4: external heat exchanger sensor
T5: heating return sensor
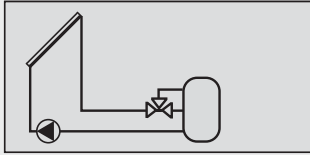
Display: 2.1.5

System 5: 1 collector array – 1 storage tank with zone loading

Description of the solar function: the solar circuit pump R1 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or a safety limit is reached, the solar circuit pump R1 is switched off again.

Description of the zone loading: the zone loading valve R2 is switched on (loading of the upper storage tank zone) as soon as the temperature difference between the collector array A1 (T1) and the upper loading zone (T3) has reached the switch-on temperature difference. When the switch-off temperature difference or a safety limit is reached, or the solar circuit pump R1 is switched off, the zone loading valve R2 switches off.

NOTE

When no voltage is on the system, the switching valve R2 must be set to the lower loading zone (T2).

Loading strategy of solar circuit pump R1: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank
D1: wire bridge
R1: solar circuit pump
R2: zone loading
     switching valve
T1: collector sensor
T2: sensor at bottom of storage
     tank
T3: storage tank
     zone loading sensor

System 6: 1 collector array – 1 storage tank with zone loading – heating return increase

Description of the solar function: the solar circuit pump R1 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or a safety limit is reached, the solar circuit pump R1 is switched off again.

Description of the zone loading: the zone loading valve R2 is switched on (loading of the upper storage tank zone) as soon as the temperature difference between the collector array A1 (T1) and the upper loading zone (T3) has reached the switch-on temperature difference. When the switch-off temperature difference or a safety limit is reached, or the solar circuit pump R1 is switched off, the zone loading valve R2 switches off.

Description of the heating return increase: the 3-way valve R3 in the heating return is switched on (water flows through storage tank) as soon as the switch-on temperature difference between the storage tank B1 (T4) and the heating return (T5) is reached. When the switch-off temperature difference (T4 – T5) is reached, the 3-way valve R3 returns to its initial state. Water does not flow through the storage tank.

NOTE

When no voltage is on the system, the switching valve R2 must be set to the lower loading zone (T2).

When no voltage is on the system, the switching valve R3 must be set in such a manner that water does **not** flow through the storage tank.

Loading strategy of solar circuit pump R1: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").
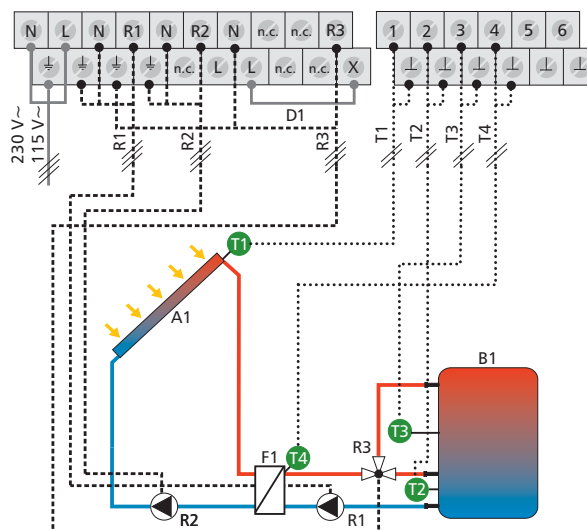**Activating the system:** see chapter 7.2 "Selecting a system".

Terminal layout
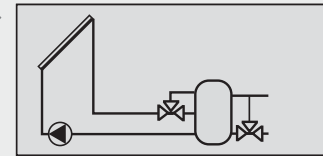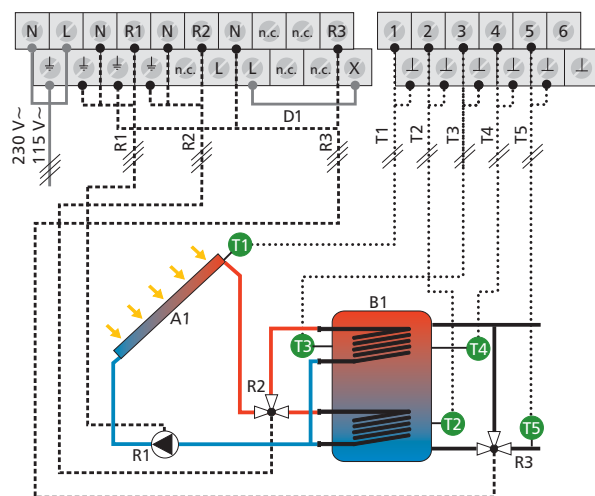
Display: 2.1.6

A1: collector array
B1: storage tank
D1: wire bridge
R1: solar circuit pump
R2: zone loading switching valve
R3: heating return increase switching valve
T1: collector sensor
T2: sensor at bottom of storage tank
T3: storage tank zone loading sensor
T4: heating return increase storage tank sensor
T5: heating return sensor
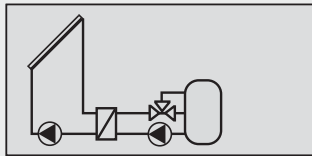
Display: 2.1.7

System 7: 1 collector array – 1 storage tank with zone loading and external heat exchanger

Description of the solar function: the solar circuit pump R2 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) is reached. When the switch-off temperature difference or a safety limit is reached, the solar circuit pump R2 switches off. The storage tank loading pump R1 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the storage tank B1 (T2) is reached. The storage tank is loaded until the switch-off temperature difference between the external heat exchanger F1 (T4) and the storage tank B1 (T2) is reached, or until a safety limit is reached.

Description of the zone loading: the zone loading valve R3 is switched on (loading of the upper storage tank zone) as soon as the temperature difference between the external heat exchanger F1 (T4) and the upper loading zone (T3) has reached the switch-on temperature difference. When the switch-off temperature difference or a safety limit is reached, or the storage tank loading pump R1 is switched off, the zone loading valve R3 switches off.

NOTE

When no voltage is on the system, the switching valve R3 must be set to the lower loading zone (T2).

Loading strategy of storage tank loading pump R1 and solar circuit pump R2: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump
R2: solar circuit pump
R3: zone loading
    switching valve
T1: collector sensor
T2: sensor at bottom of storage
    tank
T3: storage tank
    zone loading sensor
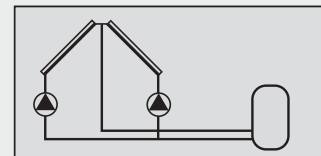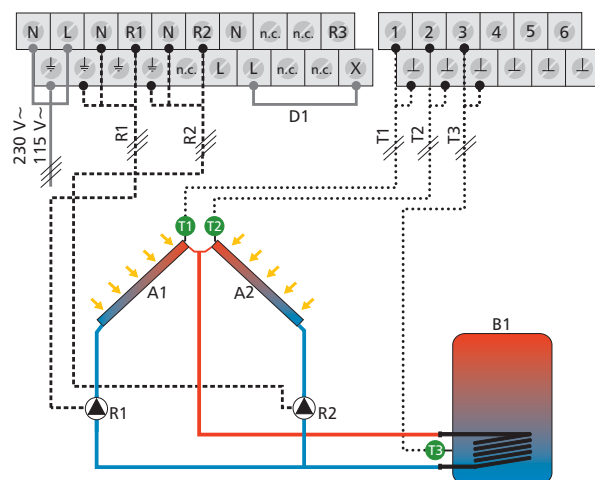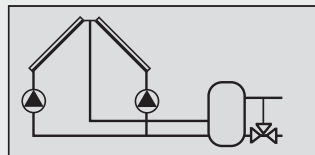T4: external heat exchanger
    sensor

System 8: 2 collector arrays (east/west roof) – 1 storage tank

Description of the solar function: when the switch-on temperature difference between the storage tank B1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R2 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R1, R2 are switched on. When the switch-off temperature difference between the collector array A1, A2 (T1, T2) and the storage tank B1 (T3) or a safety limit is reached, the solar circuit pumps R1, R2 are switched off again.

Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

Display: 2.1.8

A1: collector array 1
A2: collector array 2
B1: storage tank
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
T1: collector sensor 1
T2: collector sensor 2
T3: sensor at bottom of storage
    tank

Display: 2.1.9

System 9: 2 collector arrays (east/west roof) – 1 storage tank – heating return increase

Description of the solar function: when the switch-on temperature difference between the storage tank B1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R2 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R1, R2 are switched on. When the switch-off temperature difference between the collector array A1, A2 (T1, T2) and the storage tank B1 (T3) or a safety limit is reached, the solar circuit pumps R1, R2 are switched off again.
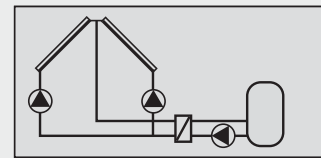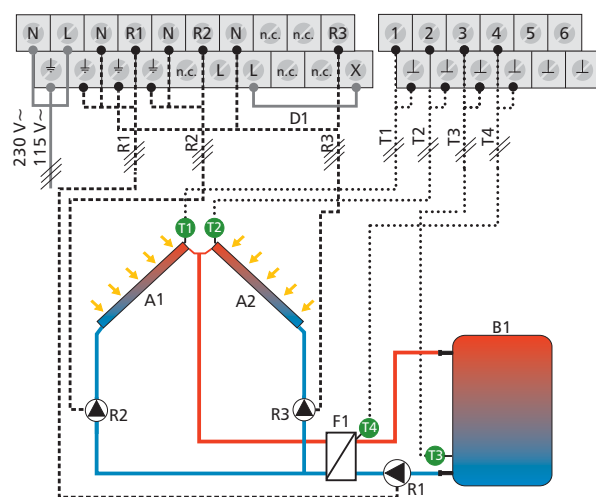
Description of the heating return increase: the 3-way valve R3 in the heating return is switched on (water flows through storage tank) as soon as the switch-on temperature difference between the storage tank B1 (T4) and the heating return (T5) is reached. When the switch-off temperature difference (T4 – T5) is reached, the 3-way valve R3 returns to its initial state. Water does not flow through the storage tank.

NOTE

When no voltage is on the system, the switching valve R3 must be set in such a manner that water does **not** flow through the storage tank.

Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array 1
A2: collector array 2
B1: storage tank
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: heating return increase
    switching valve
T1: collector sensor 1
T2: collector sensor 2
T3: sensor at bottom of storage
    tank
T4: heating return increase
    storage tank sensor
T5: heating return sensor
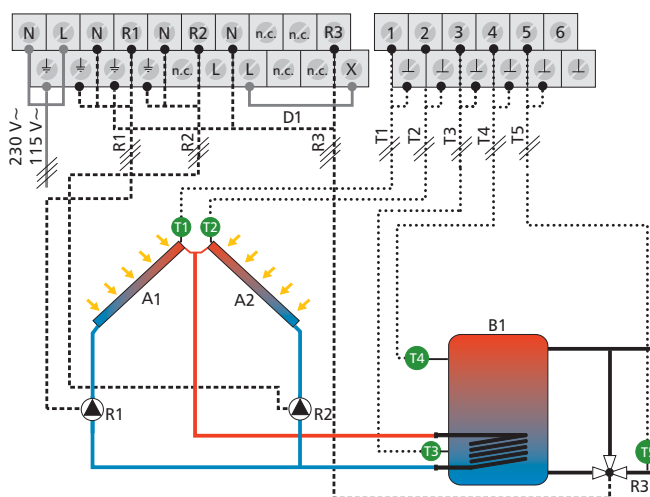
System 10: 2 collector arrays (east/west roof) – 1 storage tank with external heat exchanger

Display: 2.1.10

Description of the solar function: when the switch-on temperature difference between the storage tank B1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R3 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R2, R3 are switched on. When the switch-off temperature difference between the collector array A1, A2 (T1, T2) and the storage tank B1 (T3) or a safety limit is reached, the solar circuit pumps R2, R3 are switched off again.

The storage tank loading pump R1 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the storage tank B1 (T3) is reached. The storage tank is loaded until the switch-off temperature difference between the external heat exchanger F1 (T4) and the storage tank B1 (T3) is reached, or until a safety limit is reached.

Loading strategy of storage tank loading pump R1 and solar circuit pump R2: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R3 operates according to the switch-on and switch-off temperature difference parameter values.
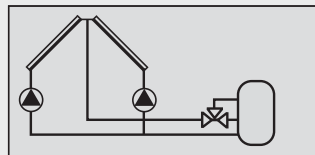
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array 1
A2: collector array 2
B1: storage tank
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump
R2: solar circuit pump 1
R3: solar circuit pump 2
T1: collector sensor 1
T2: collector sensor 2
T3: sensor at bottom of storage tank
T4: external heat exchanger sensor

Display: 2.1.11

System 11: 2 collector arrays (east/west roof) – 1 storage tank with zone loading

Description of the solar function: when the switch-on temperature difference between the storage tank B1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R2 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R1, R2 are switched on. When the switch-off temperature difference between the collector array A1, A2 (T1, T2) and the storage tank B1 (T3) or a safety limit is reached, the solar circuit pumps R1, R2 are switched off again.

Description of the zone loading: the zone loading valve R3 is switched on (loading of the upper storage tank zone) as soon as the temperature difference between the collector array A1, A2 (T1, T2) and the upper loading zone (T4) has reached the switch-on temperature difference. When the switch-off temperature difference or a safety limit is reached, or the solar circuit pump R1, R2 is switched off, the zone loading valve R3 switches off.

NOTE

When no voltage is on the system, the switching valve R3 must be set to the lower loading zone (T3).

Loading strategy of solar circuit pumps R1 and R2: in the factory, target temperature control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array 1
A2: collector array 2
B1: storage tank
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: zone loading
    switching valve
T1: collector sensor 1
T2: collector sensor 2
T3: sensor at bottom of storage
    tank
T4: storage tank
    zone loading sensor
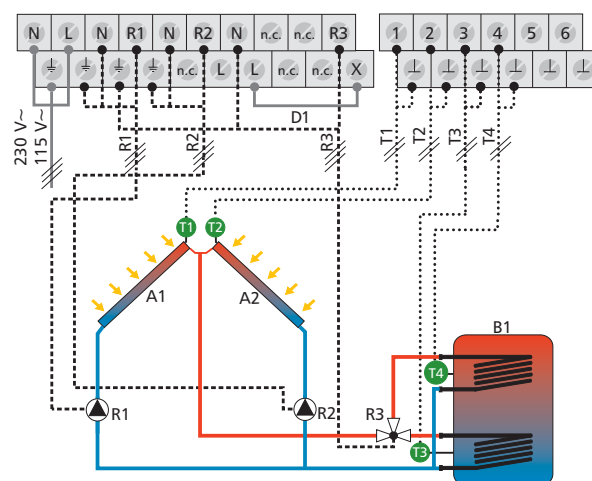
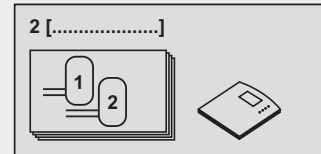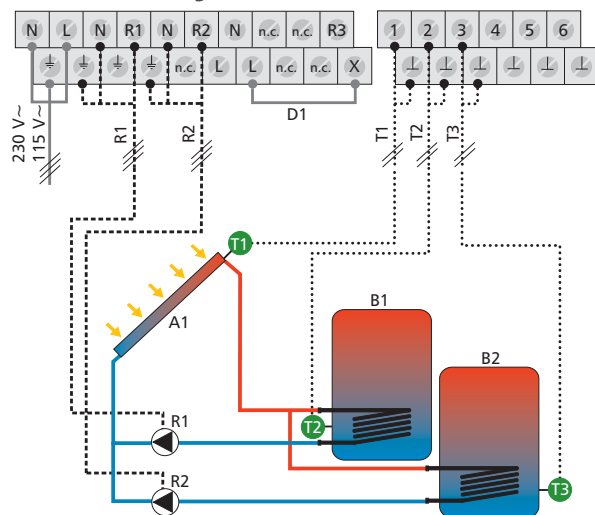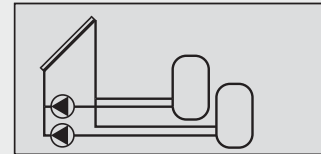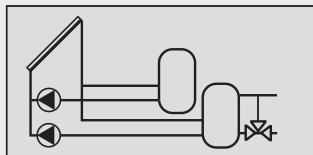## 7.2.2   System with two storage tanks

System 12: 1 collector array – 2 storage tanks – intelligent pump control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is reached, the appropriate solar circuit pump R1 or R2 is switched on. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

Display: 2.2

[Storage tank]

Display: 2.2.1

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2

Display: 2.2.2

System 13: 1 collector array – 2 storage tanks – heating return increase – intelligent pump control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is reached, the appropriate solar circuit pump R1 or R2 is switched on. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.
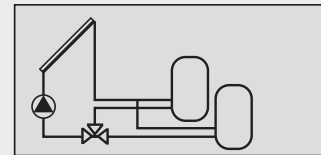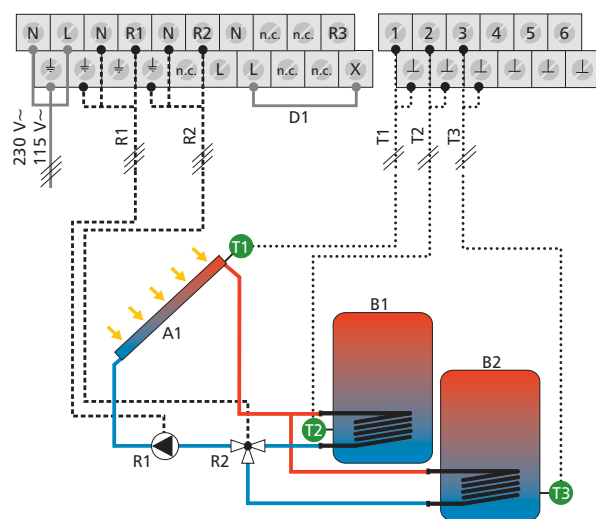
Description of the heating return increase: the 3-way valve R3 in the heating return is switched on (water flows through storage tank) as soon as the switch-on temperature difference between the storage tank B2 (T4) and the heating return (T5) is reached. When the switch-off temperature difference (T4 – T5) is reached, the 3-way valve R3 returns to its initial state. Water does not flow through the storage tank.

NOTE

When no voltage is on the system, the switching valve R3 must be set in such a manner that water does **not** flow through the storage tank.

Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: heating return increase
     switching valve
T1: collector sensor
T2: sensor at bottom of storage
     tank 1
T3: sensor at bottom of storage
     tank 2
T4: heating return increase
     storage tank sensor
T5: heating return sensor

System 14: 1 collector array – 2 storage tanks – intelligent valve control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is exceeded, the solar circuit pump R1 is switched on and the switching valve R2 is set to the correct position depending on the storage tank to be loaded. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

NOTE

When no voltage is on the system, the switching valve R2 must be set to storage tank B1.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

Display: 2.2.3

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
R1: solar circuit pump
R2: switching valve
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
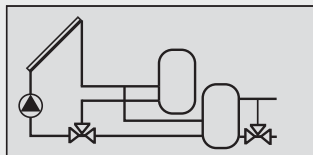
Display: 2.2.4

System 15: 1 collector array – 2 storage tanks – heating return increase – intelligent valve control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is exceeded, the solar circuit pump R1 is switched on and the switching valve R2 is set to the correct position depending on the storage tank to be loaded. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

Description of the heating return increase: the 3-way valve R3 in the heating return is switched on (water flows through storage tank) as soon as the switch-on temperature difference between the storage tank B2 (T4) and the heating return (T5) is reached. When the switch-off temperature difference (T4 – T5) is reached, the 3-way valve R3 returns to its initial state. Water does not flow through the storage tank.

NOTE

When no voltage is on the system, the switching valve R2 must be set to storage tank B1.

When no voltage is on the system, the switching valve R3 must be set in such a manner that water does **not** flow through the storage tank.
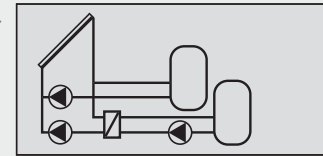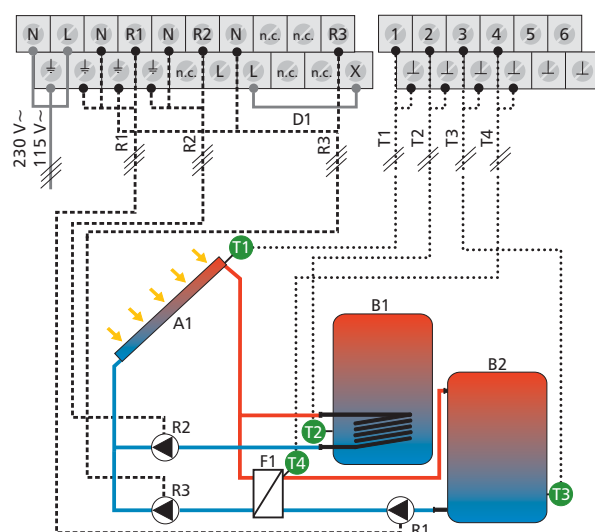
Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks (1, 2). It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
R1: solar circuit pump 1
R2: switching valve
R3: heating return increase
    switching valve
T1: collector sensor
T2: sensor at bottom of storage
    tank 1
T3: sensor at bottom of storage
    tank 2
T4: heating return increase
    storage tank sensor
T5: heating return sensor

System 16: 1 collector array – 1 storage tank – 1 storage tank with external heat exchanger – intelligent pump control

Display: 2.2.5
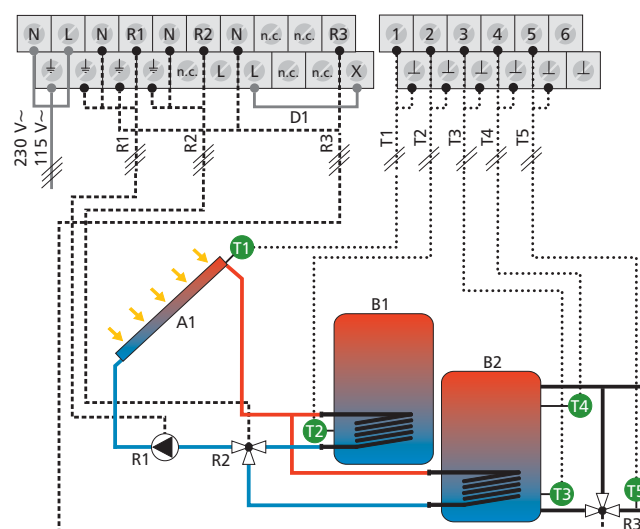
Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is reached, the appropriate solar circuit pump R2 or R3 is switched on. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

The storage tank loading pump R1 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the storage tank B2 (T3) is reached. The storage tank is loaded until the switch-off temperature difference between the external heat exchanger F1 (T4) and the storage tank B2 (T3) is reached, or until a safety limit is reached.

Loading strategy of solar circuit pump R1: in the factory, target temperature control is chosen as the loading strategy for the storage tank B2. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R3 operates according to the switch-on and switch-off temperature difference parameter values.
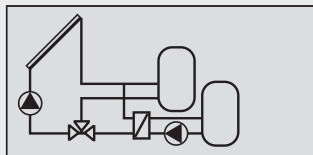
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump
R2: solar circuit pump 1
R3: solar circuit pump 2
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
T4: external heat exchanger sensor

Display: 2.2.6

System 17: 1 collector array – 1 storage tank – 1 storage tank with external heat exchanger – intelligent valve control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is exceeded, the solar circuit pump R2 is switched on and the switching valve R3 is set to the correct position depending on the storage tank to be loaded. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

The storage tank loading pump R1 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the storage tank B2 (T3) is reached. The storage tank is loaded until the switch-off temperature difference between the external heat exchanger F1 (T4) and the storage tank B2 (T3) is reached, or until a safety limit is reached.

NOTE

When no voltage is on the system, the switching valve R3 must be set to storage tank B1.

Loading strategy of storage tank loading pump R1 and solar circuit pump R2 for storage tank B2: in the factory, target temperature control is chosen as the loading strategy. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R2 for storage tank B1: in the factory, temperature differential control is chosen as the loading strategy. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump
R2: solar circuit pump
R3: switching valve
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
T4: external heat exchanger sensor

System 18: 1 collector array – 2 storage tanks with external heat exchanger – intelligent pump control

Description of the solar function: the solar circuit pump R3 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the storage tanks B1, B2 (T2, T3) or a safety limit is reached, the solar circuit pump R3 is switched off again.

When the switch-on temperature difference between the external heat exchanger F1 (T4) and one of the two storage tanks B1, B2 (T2, T3) is reached, the appropriate solar circuit pump R1 or R2 is switched on. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the external heat exchanger F1 (T4) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

Loading strategy of storage tank loading pumps R1 and R2: in the factory, target temperature control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R3 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout
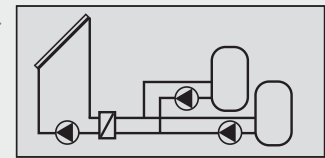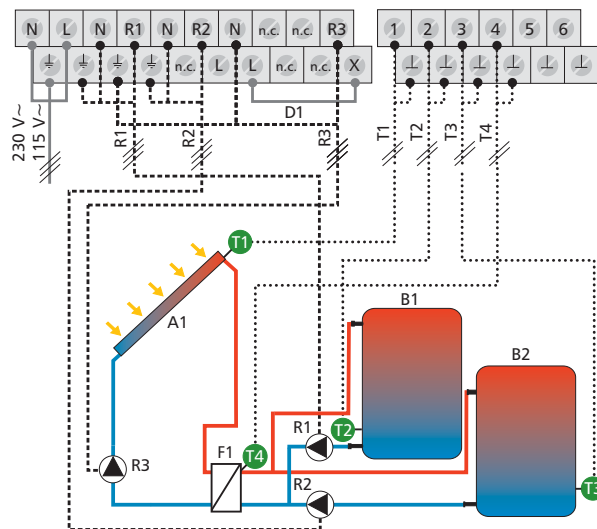
Display: 2.2.7

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump 1
R2: storage tank loading pump 2
R3: solar circuit pump
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
T4: external heat exchanger sensor
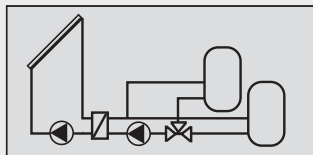
Display: 2.2.8

System 19: 1 collector array – 2 storage tanks with external heat exchanger – intelligent valve control

Description of the solar function: the solar circuit pump R2 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the storage tanks B1, B2 (T2, T3) or a safety limit is reached, the solar circuit pump R2 is switched off again.

When the switch-on temperature difference between the external heat exchanger F1 (T4) and one of the two storage tanks B1, B2 (T2, T3) is exceeded, the storage tank loading pump R1 is switched on and the switching valve R3 is set to the correct position depending on the storage tank to be loaded. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the external heat exchanger F1 (T4) and storage tanks B1, B2 (T2, T3) is reached, or a safety limit is reached.

## NOTE

When no voltage is on the system, the switching valve R2 must be set to storage tank B1.

Loading strategy of solar circuit pump R2 and storage tank loading pump R1: in the factory, target temperature control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed using the "Parameters" menu (chapter 7.4 "Parameters").

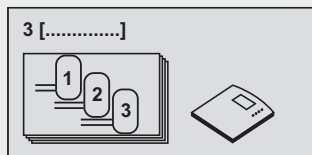**Activating the system:** see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
F1: external heat exchanger
R1: storage tank loading pump
R2: solar circuit pump
R3: switching valve
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
T4: external heat exchanger sensor
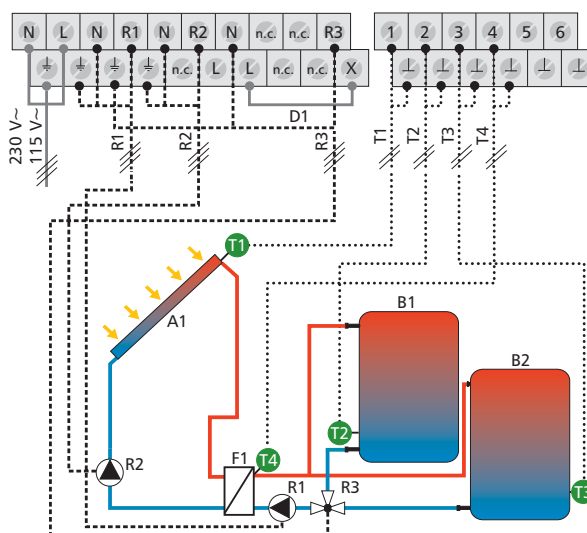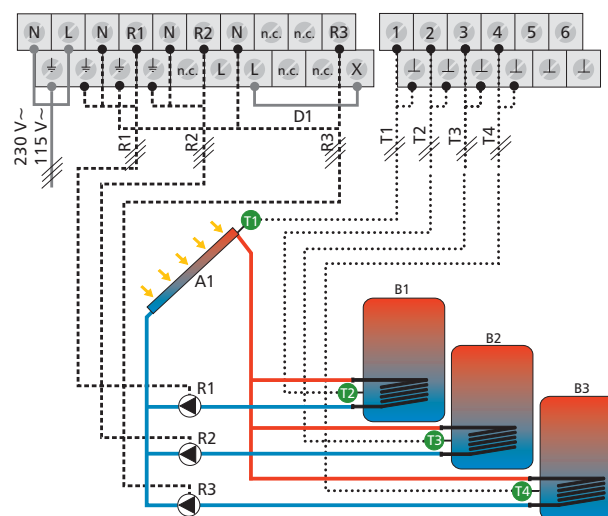
System 20: 2 collector arrays (east/west roof) – 2 storage tanks

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) or collector array A2 (T2) and one of the two storage tanks B1, B2 (T3, T4) is exceeded, the appropriate solar circuit pump R1 or R2 is switched on and the switching valve R3 is set to the correct position depending on the storage tank to be loaded. Both storage tanks B1, B2 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1, A2 (T1, T2) and storage tanks B1, B2 (T3, T4) is reached, or a safety limit is reached.

Display: 2.2.9

NOTE

When no voltage is on the system, the switching valve R2 must be set to storage tank B1.

Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout
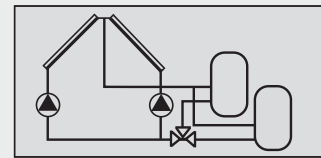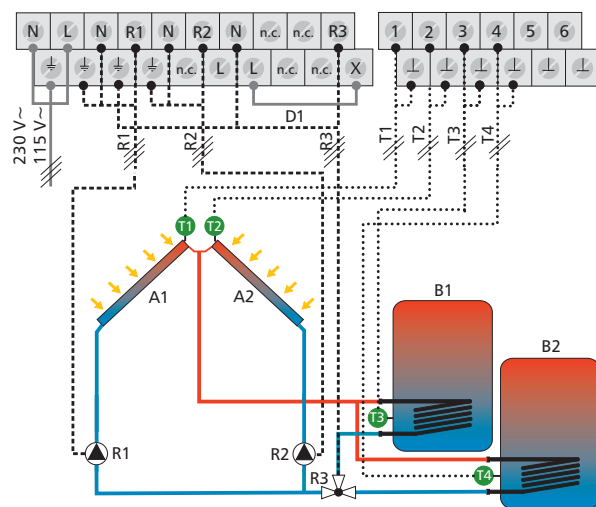
A1: collector array 1
A2: collector array 2
B1: storage tank 1
B2: storage tank 2
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: switching valve
T1: collector sensor 1
T2: collector sensor 2
T3: sensor at bottom of storage tank 1
T4: sensor at bottom of storage tank 2

3 [.............]

Display: 2.3

[Storage tank]

Display: 2.3.1

A1: collector array
B1: storage tank 1
B2: storage tank 2
B3: storage tank 3
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: solar circuit pump 3
T1: collector sensor
T2: sensor at bottom of storage
    tank 1
T3: sensor at bottom of storage
    tank 2
T4: sensor at bottom of storage
    tank 3
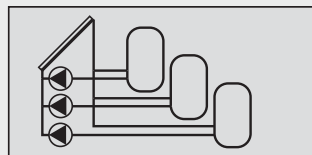
7.2.3 Systems with three storage tanks

System 21: 1 collector array – 3 storage tanks – intelligent pump control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the three storage tanks B1, B2, B3 (T2, T3, T4) is reached, the appropriate solar circuit pump R1, R2 or R3 is switched on. All three storage tanks B1, B2, B3 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2, B3 (T2, T3, T4) is reached, or a safety limit is reached.

Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

**Loading strategy of solar circuit pump R3:** it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R3 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

System 22: 1 collector array – 3 storage tanks – intelligent valve control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the three storage tanks B1, B2, B3 (T2, T3, T4) is exceeded, the solar circuit pump R1 is switched on and the switching valves R2, R3 are set to the correct position depending on the storage tank to be loaded. All three storage tanks B1, B2, B3 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2, B3 (T2, T3, T4) is reached, or a safety limit is reached.

NOTE

When no voltage is on the system, switching valve R2 must be set to storage tank B1, and switching valve R3 must be set to storage tank B2.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2, B3. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

**Activating the system:** see chapter 7.2 "Selecting a system".

Terminal layout
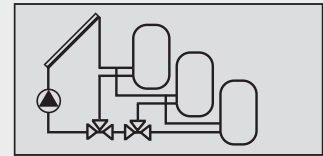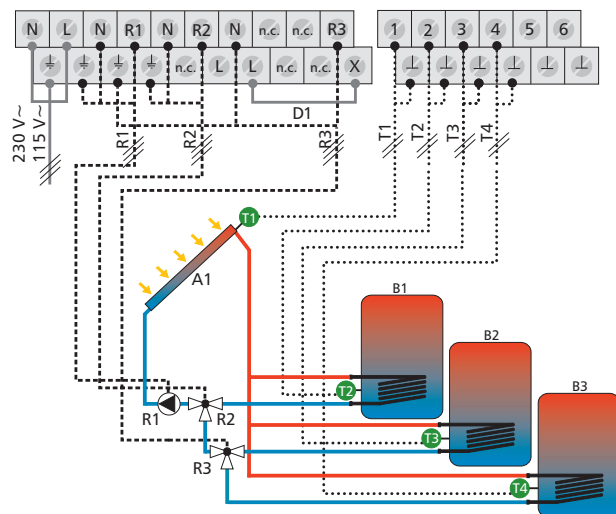
Display: 2.3.2

A1: collector array
B1: storage tank 1
B2: storage tank 2
B3: storage tank 3
D1: wire bridge
R1: solar circuit pump
R2: switching valve 1
R3: switching valve 2
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
T4: sensor at bottom of storage tank 3
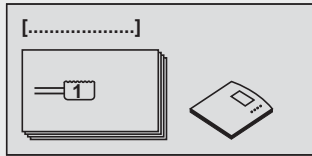
Display: 2.4

[Swimming pool]
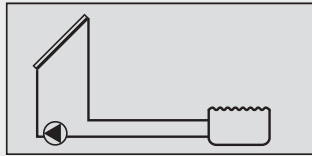
Display: 2.4.1

A1: collector array
C1: swimming pool
D1: wire bridge
R3: solar circuit pump
T1: collector sensor
T2: swimming pool sensor
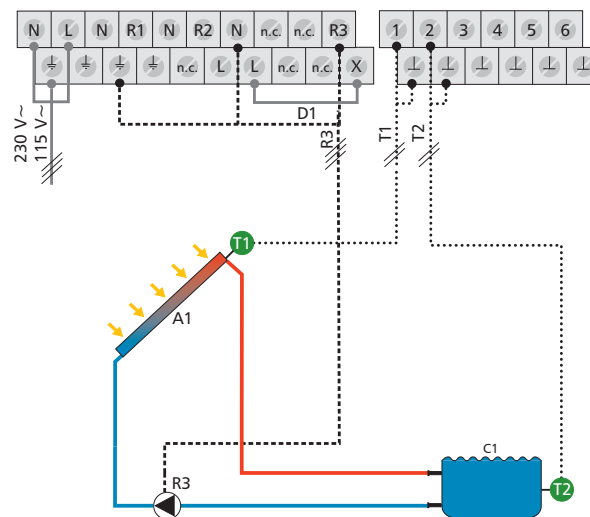
7.2.4 Systems with a swimming pool

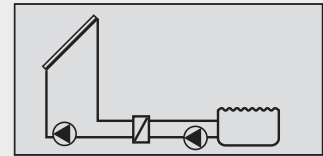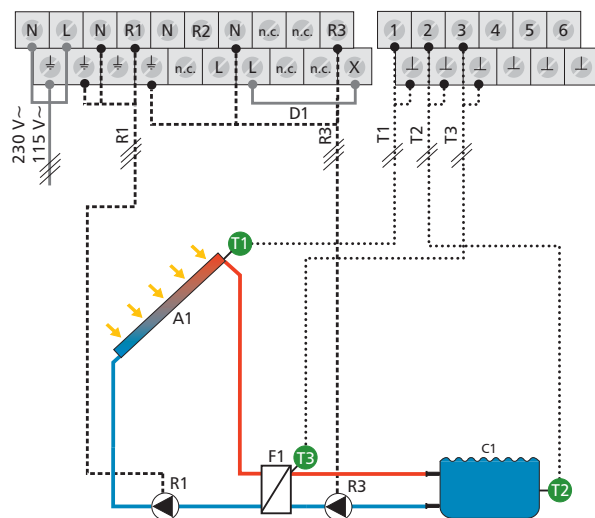### System 23: 1 collector array – 1 swimming pool

Description of the solar function: the solar circuit pump R3 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the swimming pool C1 (T2) is reached. When the switch-off temperature difference between the collector array A1 (T1) and the swimming pool C1 (T2) or a safety limit is reached, the solar circuit pump R3 is switched off again.

Loading strategy of solar circuit pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R3 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

System 24: 1 collector array – 1 swimming pool with external heat exchanger

Description of the solar function: the solar circuit pump R1 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the swimming pool C1 (T2) is reached. When the switch-off temperature difference or a safety limit is reached, the solar circuit pump R1 switches off. The swimming pool pump R3 is switched on as soon as the temperature difference between the external heat exchanger F1 (T3) and the swimming pool C1 (T2) reaches the switch-on temperature difference. When the switch-off temperature difference between the external heat exchanger F1 (T3) and the swimming pool C1 (T2) or a safety limit is reached, the swimming pool pump R3 switches off.

Loading strategy of solar circuit pump R1: in the factory, the loading strategy of solar circuit pump R1 is set to temperature differential control. This cannot be altered.

Loading strategy of swimming pool pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Swimming pool pump R3 operates according to the switch-on and switch-off temperature difference parameter values.
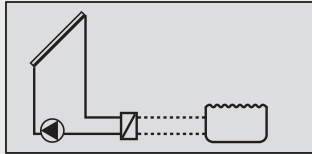
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

Display: 2.4.2

A1: collector array
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump
R3: swimming pool pump
T1: collector sensor
T2: swimming pool sensor
T3: external heat exchanger sensor

Display: 2.4.3

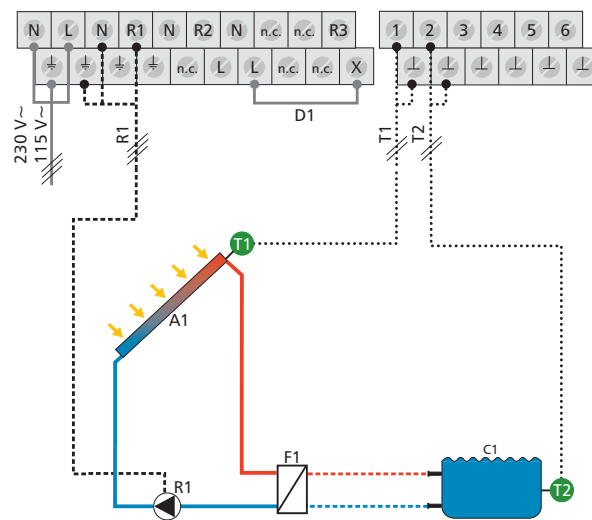# System 25: 1 collector array – 1 swimming pool in stand-alone operation with external heat exchanger

Description of the solar function: the solar circuit pump R1 is switched on as soon as the switch-on temperature difference between the collector array A1 (T1) and the swimming pool C1 (T2) is reached. When the switch-off temperature difference or a safety limit is reached, the solar circuit pump R1 switches off. The swimming pool pump is controlled externally.

Loading strategy of solar circuit pump R1: in the factory, the loading strategy is set to temperature differential control. This cannot be altered.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump
T1: collector sensor
T2: swimming pool sensor

System 26: 2 collector arrays (east/west roof) – 1 swimming pool

Description of the solar function: when the switch-on temperature difference between the swimming pool C1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R2 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R1, R2 are switched on. The pumps switch off independently of each other, when either the relevant switch-off temperature between one of the collector arrays A1, A2 (T1, T2) and the swimming pool C1 (T3) or a safety limit is reached.

Loading strategy of solar circuit pumps R1 and R2: in the factory, the loading strategies are set to temperature differential control. These cannot be altered.

NOTE

In the factory, RPM control is deactivated for solar circuit pumps R1 and R2. This can be changed in the "Parameters" menu (chapter 7.4 "Parameters"). If RPM control is activated, the loading strategy of solar circuit pumps R1 and R2 is set to temperature differential control. This cannot be altered.
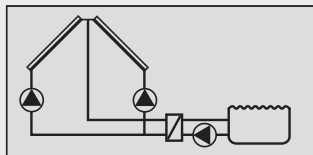
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout
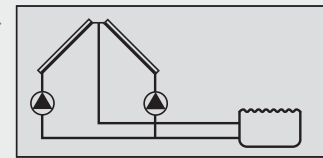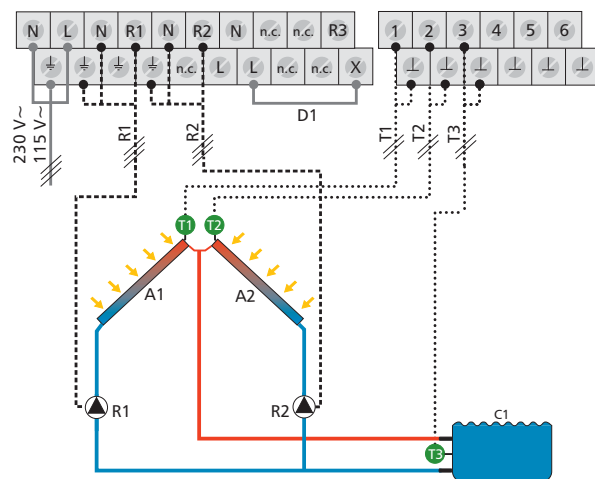
Display: 2.4.4

A1: collector array 1
A2: collector array 2
C1: swimming pool
D1: wire bridge
R1: solar circuit pump 1
R2: solar circuit pump 2
T1: collector sensor 1
T2: collector sensor 2
T3: swimming pool sensor

Display: 2.4.5

System 27: 2 collector arrays (east/west roof) – 1 swimming pool with external heat exchanger

Description of the solar function: when the switch-on temperature difference between the swimming pool C1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R2 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R1, R2 are switched on. When the switch-off temperature difference between the collector array A1, A2 (T1, T2) and the swimming pool C1 (T3) or a safety limit is reached, the solar circuit pumps R1, R2 are switched off again.

The swimming pool pump R3 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the swimming pool C1 (T3) is reached. When the switch-off temperature difference between the external heat exchanger F1 (T4) and the swimming pool C1 (T3) or a safety limit is reached, the swimming pool pump R3 switches off.
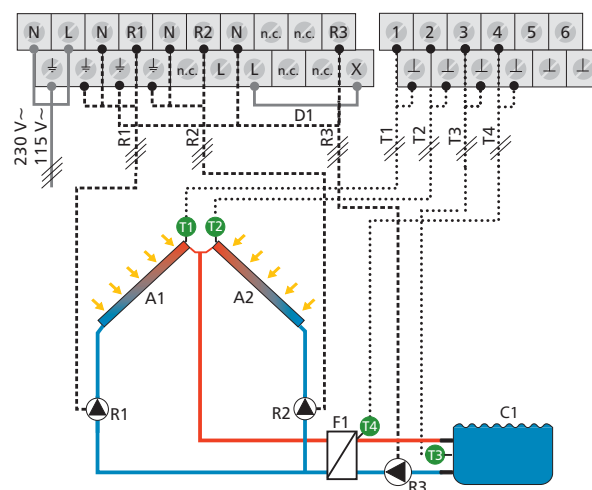
Loading strategy of solar circuit pumps R1 and R2: in the factory, the loading strategies of solar circuit pumps R1 and R2 are set to temperature differential control. These cannot be altered.

Loading strategy of swimming pool pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Swimming pool pump R3 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array 1
A2: collector array 2
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: swimming pool pump
T1: collector sensor 1
T2: collector sensor 2
T3: swimming pool sensor
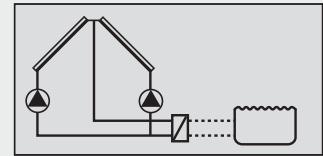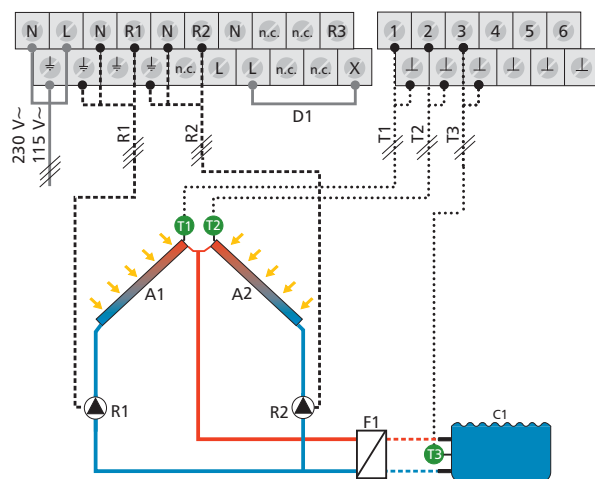T4: external heat exchanger sensor

System 28: 2 collector arrays (east/west roof) – 1 swimming pool in stand-alone operation with external heat exchanger

Description of the solar function: when the switch-on temperature difference between the swimming pool C1 (T3) and one or the other of the collector arrays A1, A2 (T1, T2) is reached, then either solar circuit pump R1 for collector array A1 (T1), or solar circuit pump R2 for collector array A2 (T2) is switched on, depending on where the temperature difference occurs. When the switch-on temperature difference is reached for both collector arrays A1, A2 (T1, T2), then both pumps R1, R2 are switched on. The pumps switch off independently of each other, when either the relevant switch-off temperature between one of the collector arrays A1, A2 (T1, T2) and the swimming pool C1 (T3) or a safety limit is reached. The swimming pool pump is controlled externally.

Loading strategy of solar circuit pumps R1 and R2: in the factory, the loading strategies are set to temperature differential control. These cannot be altered.
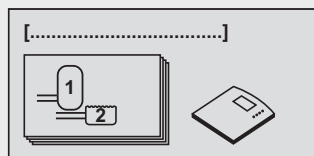
**Activating the system:** see chapter 7.2 "Selecting a system".

Terminal layout

Display: 2.4.6

A1: collector array 1
A2: collector array 2
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump 1
R2: solar circuit pump 2
T1: collector sensor 1
T2: collector sensor 2
T3: swimming pool sensor

[.................................]

Display: 2.5

[Storage tank + swimming pool]

Display: 2.5.1

A1: collector array
B1: storage tank
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: swimming pool pump
T1: collector sensor
T2: sensor at bottom of storage
    tank
T3: swimming pool sensor
T4: external heat exchanger
    sensor
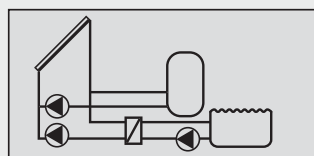
7.2.5 Systems with one storage tank and a swimming pool

System 29: 1 collector array – 1 storage tank – 1 swimming pool with external heat exchanger – intelligent pump control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or the swimming pool C1 (T3) is reached, the appropriate solar circuit pump R1 or R2 is switched on. The storage tank B1 and the swimming pool C1 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tank/swimming pool B1, C1 (T2, T3) is reached, or a safety limit is reached.

The swimming pool pump R3 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the swimming pool C1 (T3) is reached. When the switch-off temperature difference between the external heat exchanger F1 (T4) and the swimming pool C1 (T3) or a safety limit is reached, the swimming pool pump R3 switches off.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").
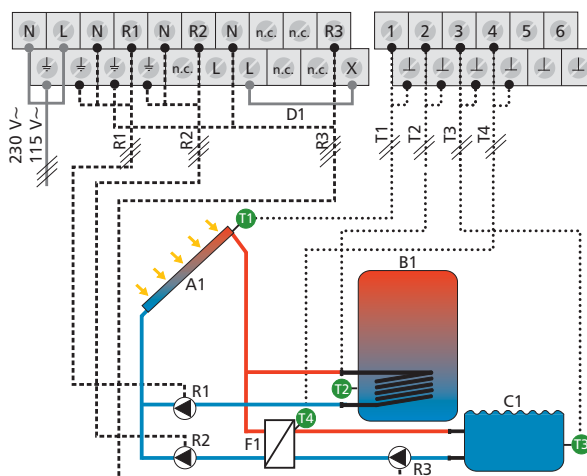
Loading strategy of solar circuit pump R2: in the factory, the loading strategy of solar circuit pump R2 is set to temperature differential control. This cannot be altered.

Loading strategy of swimming pool pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Swimming pool pump R3 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

System 30: 1 collector array – 1 storage tank – 1 swimming pool with external heat exchanger – intelligent valve control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or the swimming pool C1 (T3) is reached, the solar circuit pump R1 is switched on and the switching valve R2 is set to the correct position depending on the storage tank/swimming pool to be loaded. The storage tank B1 and the swimming pool C1 are loaded one after the other, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or the swimming pool C1 (T3) is reached, or a safety limit is reached.

The swimming pool pump R3 is switched on as soon as the switch-on temperature difference between the external heat exchanger F1 (T4) and the swimming pool C1 (T3) is reached. When the switch-off temperature difference between the external heat exchanger F1 (T4) and the swimming pool C1 (T3) or a safety limit is reached, the swimming pool pump R3 switches off.

NOTE

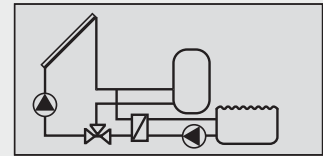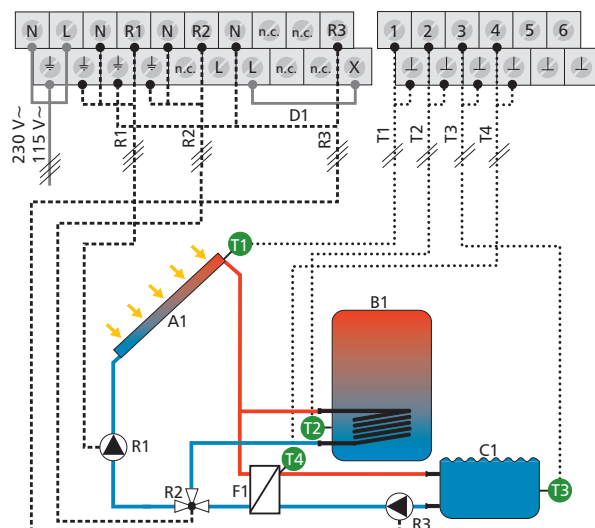When no voltage is on the system, the switching valve R2 must be set to storage tank B1.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

In the factory, the loading strategy for the swimming pool C1 is set to temperature differential control. This cannot be altered.

Loading strategy of swimming pool pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Swimming pool pump R3 operates according to the switch-on and switch-off temperature difference parameter values.
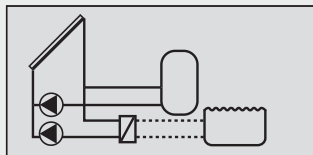
Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

Display: 2.5.2

A1: collector array
B1: storage tank
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump
R2: switching valve
R3: swimming pool pump
T1: collector sensor
T2: sensor at bottom of storage tank
T3: swimming pool sensor
T4: external heat exchanger sensor

Display: 2.5.3

System 31: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control
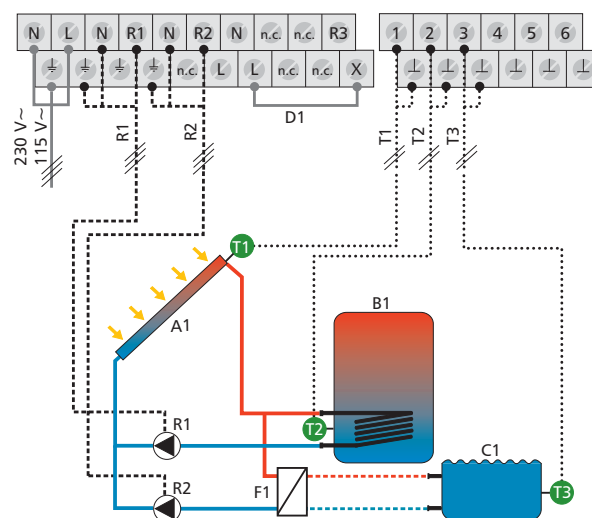
Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or the swimming pool C1 (T3) is reached, the appropriate solar circuit pump R1 or R2 is switched on. Either storage tank B1 or the swimming pool C1 is loaded, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tank/swimming pool B1, C1 (T2, T3) is reached, or a safety limit is reached. The swimming pool pump is controlled externally.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R2: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R2 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump 1
R2: solar circuit pump 2
T1: collector sensor
T2: sensor at bottom of storage tank
T3: swimming pool sensor

System 32: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or the swimming pool C1 (T3) is reached, the solar circuit pump R1 is switched on and the switching valve R2 is set to the correct position depending on the storage tank/swimming pool to be loaded. Either storage tank B1 or the swimming pool C1 is loaded, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and the storage tank B1 (T2) or swimming pool C1 (T3) is reached, or a safety limit is reached. The swimming pool pump is controlled externally.

NOTE

When no voltage is on the system, the switching valve R2 must be set to storage tank B1.

Loading strategy of solar circuit pump R1 for storage tank: in the factory, temperature differential control is chosen as the loading strategy for the storage tank B1. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R1 for swimming pool: in the factory, the loading strategy for the swimming pool C1 is set to temperature differential control. This cannot be altered.
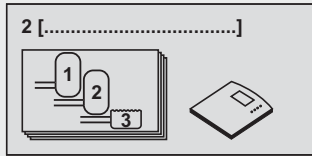
Activating the system: see chapter 7.2 "Selecting a system".
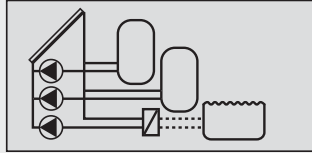
Terminal layout
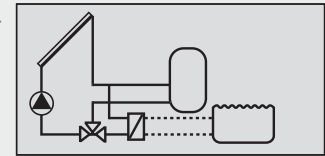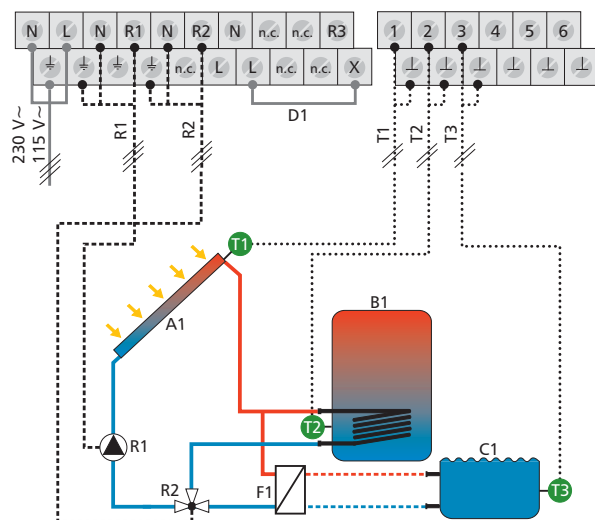
Display: 2.5.4

A1: collector array
B1: storage tank
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump
R2: switching valve
T1: collector sensor
T2: sensor at bottom of storage tank
T3: swimming pool sensor

Display: 2.6

[Storage tank + swimming pool]

Display: 2.6.1

7.2.6 Systems with two storage tanks and a swimming pool

System 33: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) or the swimming pool C1 (T4) is reached, the appropriate solar circuit pump R1, R2 or R3 is switched on. Either storage tank B1, storage tank B2 or the swimming pool C1 is loaded, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3)/swimming pool C1 (T4) is reached, or a safety limit is reached. The swimming pool pump is controlled externally.
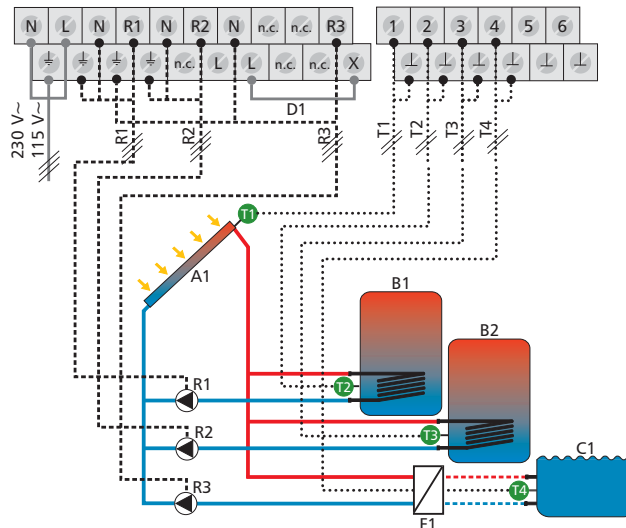
Loading strategy of solar circuit pumps R1 and R2: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

Loading strategy of solar circuit pump R3: it is not possible to select whether temperature differential control or target temperature control is to be used as the loading strategy. Solar circuit pump R3 operates according to the switch-on and switch-off temperature difference parameter values.

Activating the system: see chapter 7.2 "Selecting a system".

A1: collector array
B1: storage tank 1
B2: storage tank 2
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump 1
R2: solar circuit pump 2
R3: solar circuit pump 3
T1: collector sensor
T2: sensor at bottom of storage tank 1
T3: sensor at bottom of storage tank 2
T4: swimming pool sensor

Terminal layout

System 34: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control

Display: 2.6.2

Description of the solar function: when the switch-on temperature difference between the collector array A1 (T1) and one of the two storage tanks B1, B2 (T2, T3) or the swimming pool C1 (T4) is exceeded, the solar circuit pump R1 is switched on and the switching valves R2, R3 are set to the correct position depending on the storage tank/swimming pool to be loaded. Either storage tank B1, storage tank B2 or the swimming pool C1 is loaded, according to the priority control (chapter 7.5 "Storage tank priority"), until either the relevant switch-off temperature difference between the collector array A1 (T1) and storage tanks B1, B2 (T2, T3)/swimming pool C1 (T4) is reached, or a safety limit is reached. The swimming pool pump is controlled externally.
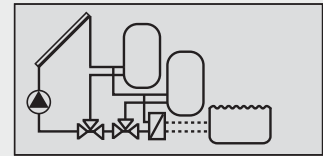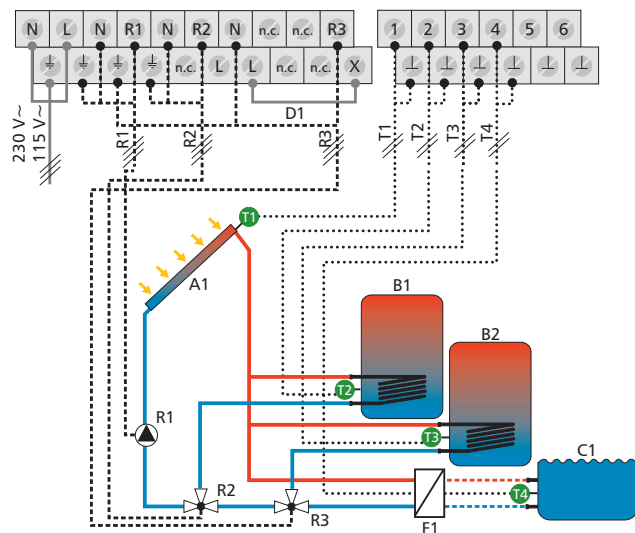
NOTE

When no voltage is on the system, switching valve R2 must be set to storage tank B1, and switching valve R3 must be set to storage tank B2.

Loading strategy of solar circuit pump R1: in the factory, temperature differential control is chosen as the loading strategy for the storage tanks B1, B2. It can be adjusted or changed to target temperature control using the "Parameters" menu (chapter 7.4 "Parameters").

In the factory, the loading strategy for the swimming pool C1 is set to temperature differential control. This cannot be altered.
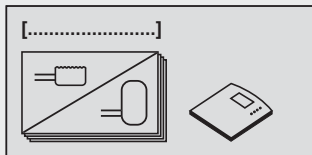
**Activating the system:** see chapter 7.2 "Selecting a system".

Terminal layout

A1: collector array
B1: storage tank 1
B2: storage tank 2
C1: swimming pool
D1: wire bridge
F1: external heat exchanger
R1: solar circuit pump
R2: switching valve 1
R3: switching valve 2
T1: collector sensor
T2: sensor at bottom of storage tank 1
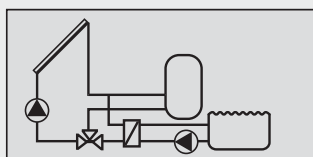T3: sensor at bottom of storage tank 2
T4: swimming pool sensor

Display: 2.7

[Seasonal systems]
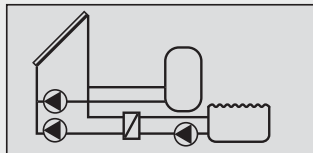
Display: 2.7.1

Display: 2.7.2

7.2.7 Seasonal systems

**System 35: 1 collector array – 1 storage tank –
1 swimming pool with external heat
exchanger – intelligent pump control**

Description of the solar function: this system's controller function corresponds to System 29.

The special feature of the seasonal system: it is possible to switch with ease between summer and winter priority control. The seasonal storage priority control can be defined in the storage priority menu (chapter 7.5 "Storage priority"). The respective season is selected directly following the activation of a seasonal system. To make it easier to switch between the seasons, the season selection appears as the first item when the menu is selected (see menu overview in chapter 7).

Factory priority control setting:

- Summer: storage tank 1 -> swimming pool
- Winter: only storage tank 1

Terminal layout: see System 29

**System 36: 1 collector array – 1 storage tank –
1 swimming pool with external heat
exchanger – intelligent valve control**

Description of the solar function: this system's controller function corresponds to System 30.

The special feature of the seasonal system: it is possible to switch with ease between summer and winter priority control. The seasonal storage priority control can be defined in the storage priority menu (chapter 7.5 "Storage priority"). The respective season is selected directly following the activation of a seasonal system. To make it easier to switch between the seasons, the season selection appears as the first item when the menu is selected (see menu overview in chapter 7).

Factory priority control setting:

- Summer: storage tank 1 -> swimming pool
- Winter: only storage tank 1

Terminal layout: see System 30

System 37: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control
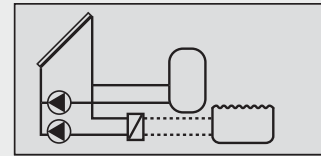
Description of the solar function: this system's controller function corresponds to System 31.

The special feature of the seasonal system: it is possible to switch with ease between summer and winter priority control. The seasonal storage priority control can be defined in the storage priority menu (chapter 7.5 "Storage priority"). The respective season is selected directly following the activation of a seasonal system. To make it easier to switch between the seasons, the season selection appears as the first item when the menu is selected (see menu overview in chapter 7).

Factory priority control setting:
- Summer: storage tank 1 -> swimming pool
- Winter: only storage tank 1

Terminal layout: see System 31

Display: 2.7.3

System 38: 1 collector array – 1 storage tank – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control
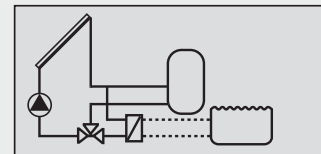
Description of the solar function: this system's controller function corresponds to System 32.

The special feature of the seasonal system: it is possible to switch with ease between summer and winter priority control. The seasonal storage priority control can be defined in the storage priority menu (chapter 7.5 "Storage priority"). The respective season is selected directly following the activation of a seasonal system. To make it easier to switch between the seasons, the season selection appears as the first item when the menu is selected (see menu overview in chapter 7).
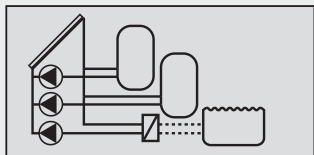
Factory priority control setting:
- Summer: storage tank 1 -> swimming pool
- Winter: only storage tank 1

Terminal layout: see System 32

Display: 2.7.4

System 39: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent pump control
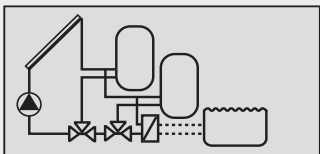

Display: 2.7.5

Description of the solar function: this system's controller function corresponds to System 33.

The special feature of the seasonal system: it is possible to switch with ease between summer and winter priority control. The seasonal storage priority control can be defined in the storage priority menu (chapter 7.5 "Storage priority"). The respective season is selected directly following the activation of a seasonal system. To make it easier to switch between the seasons, the season selection appears as the first item when the menu is selected (see menu overview in chapter 7).

Factory priority control setting:
- Summer: storage tank 1 -> swimming pool
- Winter: storage tank 1 -> storage tank 2

Terminal layout: see System 33

System 40: 1 collector array – 2 storage tanks – 1 swimming pool in stand-alone operation with external heat exchanger – intelligent valve control

Display: 2.7.6

Description of the solar function: this system's controller function corresponds to System 34.

The special feature of the seasonal system: it is possible to switch with ease between summer and winter priority control. The seasonal storage priority control can be defined in the storage priority menu (chapter 7.5 "Storage priority"). The respective season is selected directly following the activation of a seasonal system. To make it easier to switch between the seasons, the season selection appears as the first item when the menu is selected (see menu overview in chapter 7).

Factory priority control setting:
- Summer: storage tank 1 -> swimming pool
- Winter: storage tank 1 -> storage tank 2

Terminal layout: see System 34

7.3 Functions

Additional controller settings can be made by using the "Functions" submenu.

The following submenus can be opened using the "Functions" menu item:

- Circulation 7.3.2
- Back-up heating 7.3.3
- Solid fuel boiler 7.3.4
- Quick charge 7.3.5
- Bypass 7.3.6
- Heat quantity 7.3.7
- Thermostat 7.3.8
- Difference thermostat 7.3.9
- Time function 7.3.10
- Interval 7.3.11
- Stagnation reduction 7.3.12
- Holiday function/recooling 7.3.13
- Frost protection 7.3.14
- Anti-legionella function 7.3.15
- Display storage tank top 7.3.16
- Data logger 7.3.17
- Alarm output 7.3.18

An overview of the factory settings and the ranges of possible settings can be found in the table in chapter 15.3 "Parameter values for functions".

7.3.1 Accessing a function

Before making settings within a function, you must perform the following steps:

Selecting a function

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select the menu item "Functions".
▶ **SET:** open the submenu "Functions".
▶ △▽: selecting a function.

Activating/deactivating a function
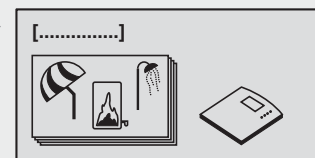
▶ **SET:** press button.
  ⇨ *The display for activating (on) or deactivating (off) the function is shown.*
▶ **SET:** press button for approx. 2 sec.
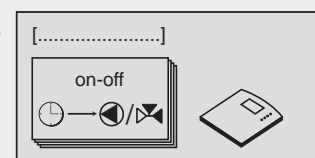 ⇨ *The function is activated or deactivated.*

NOTE

An information window is displayed if the function cannot be activated (see chapter 12 "Information windows").
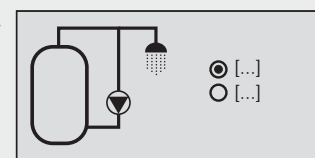
Selecting an output

▶ ▽: press button.
  ⇨ *The display for setting the output appears.*
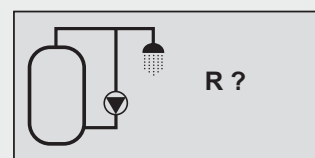▶ **SET:** press button.
  ⇨ *Output (?) flashes.*

Display: 3
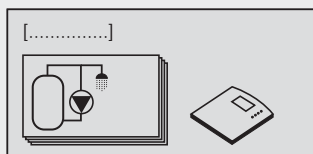[Function]

[Time function]

[off]
[on]

Display example

▶ △▽: selecting an output.

▶ **SET:** press button to confirm.

NOTE

R? or T? indicates an output or input which has not yet been selected. Only outputs which are not yet required by the respective system can be selected. Double allocation of outputs is not possible. However, double allocation of inputs is possible. This is also displayed in an information window (see chapter 12).

Leaving the menu

▶ **ESC:** press button.

7.3.2 Circulation function

A circulation pump can be controlled in a time-based, temperature-based, or pulse-based manner. These types of control can also be combined with each other.

Time control: time switch with 3 time windows.

Temperature control: when the temperature in the circulation return falls below the "on" value, then the pump is switched on until the "off" temperature is reached.
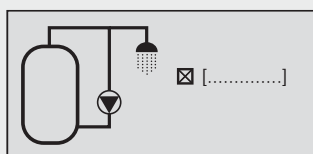
NOTE

In order to avoid measurement errors caused by the pipe's thermal conduction, a minimum clearance space of 1.50 m from the storage tank should be observed when installing the circulation sensor.
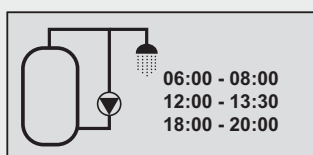
Pulse control: when the circulation function is requested via a pulse (e.g. from a flow switch), the pump runs for the set circulation duration. Subsequently, no further requests are accepted until the set wait time has expired.

Activating time control

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Circulation activated, see "Activating a function" (see chapter 7.3.1)*

✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*

▶ ▽: press button.
⇨ *The "Time controlled" display appears.*

▶ **SET:** press button.
⇨ *Time control is activated.*

▶ ▽: press button.
⇨ *The display for setting the duration appears.*

▶ **SET:** press button.
⇨ *The time flashes in the display.*

▶ △▽: set the duration.

▶ **SET:** confirm the value and go to the next value.
⇨ *The settings are saved.*

NOTE

The switch-on time must always be before the switch-off time. Therefore, when the switch-on value is being adjusted, the switch-off value will also be changed to a later time if necessary. Adjusting the switch-off value to a time before the switch-on value is blocked.

Display: 3.1

[Circulation]

Display: 3.1.3

[Time controlled]

Display: 3.1.3.1

06:00 - 08:00
12:00 - 13:30
18:00 - 20:00

Activating temperature control

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*
✓ *Circulation activated, see "Activating a function" (see chapter 7.3.1)*
✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*
▶ ▽: press button.
 ⇨ *The "Temp. controlled" display appears.*
▶ **SET:** press button.
 ⇨ *Temperature control is activated.*
▶ ▽: press button.
 ⇨ *The display for setting the temperature input and the "on" and "off" values appears.*
▶ **SET:** press button.
 ⇨ *"T" flashes in the display (circulation pipe temperature input).*
▶ △▽: choose the desired input.
▶ **SET:** press button to confirm.
 ⇨ *The "on" value flashes after confirmation of the temperature sensor.*
▶ △▽: set the "on" value.
▶ **SET:** press button to confirm.
 ⇨ *The "off" value flashes after confirmation of the "on" value.*
▶ △▽: set the "off" value.
▶ **SET:** press button to confirm and close.
 ⇨ *The settings are saved.*

Activating pulse control

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*
✓ *Circulation activated, see "Activating a function" (see chapter 7.3.1)*
✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*
▶ ▽: press button.
 ⇨ *The "Pulse controlled" display appears.*
▶ **SET:** press button.
 ⇨ *Pulse control is activated.*
▶ ▽: press button.
 ⇨ *The display for setting the pulse input, circulation time, and wait time appears.*
▶ **SET:** press button.
 ⇨ *Pulse input flashes.*
▶ △▽: choose the desired input.
▶ **SET:** press button to confirm.
 ⇨ *The circulation duration flashes after confirmation of the input.*
▶ △▽: set the circulation duration.
▶ **SET:** press button to confirm.
 ⇨ *The wait time flashes after confirmation of the circulation duration.*
▶ △▽: set the wait time.
▶ **SET:** press button to confirm the wait time and close.
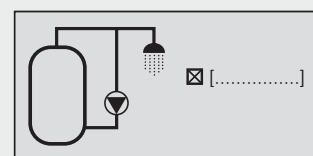 ⇨ *The settings are saved.*
▶ **ESC:** leave the "Circulation" submenu.
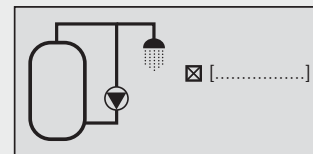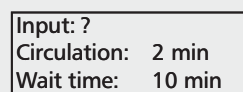

Display: 3.1.4
[Temperature controlled]
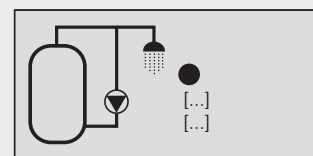
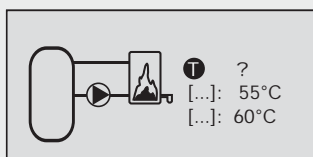Display: 3.1.4.1
[on]
[off]

Display: 3.1.5
[Pulse controlled]
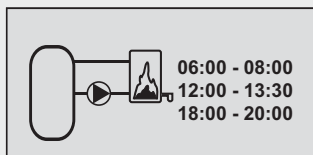
Input: ?
Circulation: 2 min
Wait time: 10 min
Display: 3.1.5.1

7.3.3   Back-up heating function

This function allows thermostatic control of an output for additional heating of the solar storage tank using an oil or gas burner. This function can also be limited to specific times by using additional time control.

Time control: time switch with 3 time windows.

Temperature control: when the temperature in the upper part of the storage tank falls below the "on" value, then the output is switched on until the "off" temperature is reached.

Choosing the input and setting the temperature limits

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Back-up heating activated, see "Activating a function" (see chapter 7.3.1).*

✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*

▶ ▽: press button.
    ⇨ *The display for setting the temperature input and the "on" and "off" values appears.*

▶ **SET:** press button.
    ⇨ *"T" flashes in the display (storage tank temperature input).*

▶ △▽: choose the desired input.

▶ **SET:** press button to confirm.
    ⇨ *The "on" value flashes in the display.*

▶ △▽: set the "on" value.

▶ **SET:** press button to confirm.
    ⇨ *The "off" value flashes after confirmation of the "on" value.*

▶ △▽: set the "off" value.

▶ **SET:** press button to confirm.
    ⇨ *The settings are saved.*

Activating time control

▶ ▽: press button.
    ⇨ *The "Time controlled" display appears.*

▶ **SET:** press button.
    ⇨ *Time control is activated.*

▶ ▽: press button.
    ⇨ *The display for setting the duration appears.*

▶ **SET:** press button.
    ⇨ *The time value flashes.*

▶ △▽: set the time value.

▶ **SET:** confirm the value and go to the next value.

⇨ *The settings are saved.*

NOTE

The switch-on time must always be before the switch-off time. Therefore, when the switch-on value is being adjusted, the switch-off value will also be changed to a later time if necessary. Adjusting the switch-off value to a time before the switch-on value is blocked.

Display: 3.2

[Back-up heating]

Display: 3.2.3

[on]
[off]

Display: 3.2.4

[Time controlled]

Display: 3.2.4.1

7.3.4   Solid fuel boiler function

This function allows control of a pump for heating of a storage tank using a solid fuel boiler.

When the temperature difference between solid fuel boiler and storage tank exceeds the "on" value, the solid fuel boiler temperature is above the "min" value, and the storage tank temperature is below the "max" value, then the pump is switched on. The pump runs until the temperature difference is lower than the "off" value, the solid fuel boiler temperature falls below the "min" value, or the storage tank temperature reaches the "max" value.

Allocating inputs and setting storage tank/solid fuel boiler temperature and switch-on/switch-off temperature difference

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*
✓ *Solid fuel boiler activated, see "Activating a function" (see chapter 7.3.1).*
✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*
▶ ▽: press button.
   ⇨ *The display for setting the temperature inputs and the switch-on/switch-off temperature difference appears.*
▶ **SET:** press button.
   ⇨ *"T" flashes in the display (storage tank temperature input).*
▶ △▽: choose the desired input.
▶ **SET:** press button to confirm.
   ⇨ *"T" flashes in the display (solid fuel boiler temperature input).*
▶ △▽: choose the desired input.
▶ **SET:** press button to confirm.
   ⇨ *The "on" value flashes in the display.*
▶ △▽: set the "on" value.
▶ **SET:** press button to confirm.
   ⇨ *The "off" value flashes after confirmation of the "on" value.*
▶ △▽: set the "off" value.
▶ **SET:** press button to confirm.
   ⇨ *The settings are saved.*

Programming the temperature limits of the solid fuel boiler and the storage tank

▶ ▽: press button.
   ⇨ *The display for setting the temperature limits for storage tank and solid fuel boiler appears.*
▶ **SET:** press button.
   ⇨ *"max" flashes in the display (storage tank's maximum temperature value).*
▶ △▽: set the "max" value.
▶ **SET:** press button to confirm.
   ⇨ *"min" flashes in the display (solid fuel boiler's minimum temperature value).*
▶ △▽: set the "min" value.
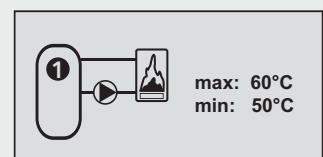▶ **SET:** press button to confirm.
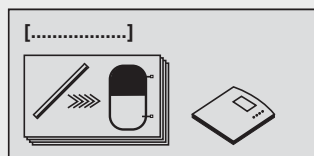   ⇨ *The settings are saved.*
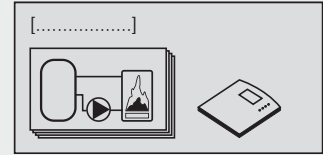
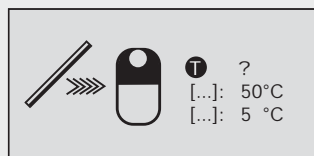Display: 3.3

[Solid fuel boiler]

Display: 3.3.3

[on]
[off]

Display: 3.3.4

[.................]

Display: 3.4

[Quick charge]

T   ?
[...]:   50°C
[...]:   5 °C

Display: 3.4.2

[on]
[off]

7.3.5   Quick charge function

This function attempts to load the upper part of the storage tank more quickly by means of a higher loading temperature in order to prevent conventional boiler back-up heating as early as possible.

When the temperature in the upper part of the storage tank falls below the "on" value, the loading strategy of storage tank 1 switches from differential loading to target temperature loading. The controller's RPM control is then used with the objective of loading the storage tank at a higher temperature level.

Setting the input for the upper part of the storage tank, and switch-on/switch-off temperatures

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Quick charge activated, see "Activating a function" (see chapter 7.3.1).*

▶ ▽: press button.
   ⇨ *The display for setting the temperature input and the "on" and "off" values appears.*

▶ **SET:** press button.
   ⇨ *"T" flashes in the display (upper storage tank temperature input).*

▶ △▽: choose the desired input.

▶ **SET:** press button to confirm.
   ⇨ *The quick charge function's "on" value flashes in the display.*

▶ △▽: set the "on" value.

▶ **SET:** press button to confirm.
   ⇨ *The "off" value flashes after confirmation of the "on" value.*

▶ △▽: set the "off" value.

▶ **SET:** press button to confirm.
   ⇨ *The settings are saved.*

NOTE

When the "on" value is adjusted, the "off" value is altered accordingly in order to maintain reliable quick charge functionality.

7.3.6   Bypass function

This function allows the solar circuit to be bypassed using a switching valve. In this way the collector circuit can be warmed before the storage tank is switched into the circuit. This is especially useful in larger solar energy systems having a large volume of heat transfer fluid.

In this conjunction, the temperature ahead of the valve is monitored in the solar circuit.

The storage tank remains separated from the solar circuit until the solar circuit temperature has reached at least 15 °C and the solar circuit temperature is higher than the lower storage tank temperature. It is only then that the storage tank is connected to the solar circuit. If the solar circuit temperature falls to 10 °C or if the solar circuit temperature lies below that of the storage tank, then the bypass will once again be activated and the storage tank will no longer be loaded.

The switch-on/off values are defined in the controller.

NOTE

When no voltage is on the system, the switching valve must be set in such a manner that the storage tank is not loaded.

Setting the input for the solar circuit temperature

✓ *"Functions" submenu selected, see "Selecting a function"*
   (see chapter 7.3.1).

✓ *Bypass activated, see "Activating a function"*
   (see chapter 7.3.1).

✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*

▶ ▽: press button.
   ⇨ *The display for setting the temperature input appears.*

▶ **SET:** press button.
   ⇨ *"T" flashes in the display (solar circuit temperature input).*

▶ △▽: choose the desired input.

▶ **SET:** press button to confirm.
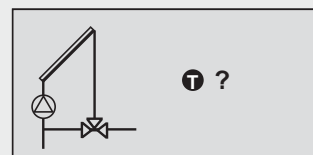   ⇨ *The settings are saved.*

⚠ CAUTION

There is a risk of frost damage to the external heat exchanger in the case of solar energy systems with long pipes in the frost region!

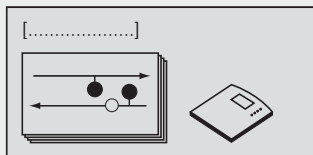▶ Use a bypass valve with a drive which has a switching time of less than 45 seconds.
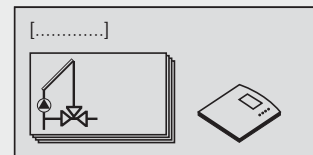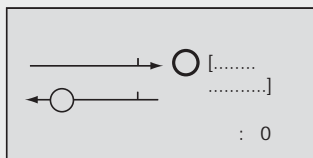

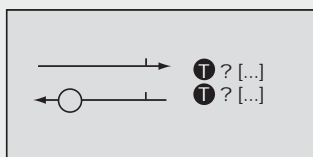Display: 3.5

[Bypass]

Display: 3.5.3

Display: 3.6

[Heat quantity]

7.3.7 Heat quantity function

The controller has a function for measuring the quantity of heat. This allows, for instance, to record the quantity of heat fed into the storage tank from the solar energy system. To do this, the temperature of the supply and return, and the flow rate of the solar energy system must be recorded. The flow rate can be read in via a pulse generator, recorded via a special Direct Sensor, or approximately calculated by means of the pump speed. Since the heat quantity depends on the proportion of glycol in the fluid, this also is accounted for in the calculations. From these values, the controller determines the quantity of heat and shows this in the display.

NOTE

When using the Direct Sensor, observe the manufacturer's technical data.

Setting the flow rate determination and the glycol proportion

✓ *"Functions" submenu selected, see "Selecting a function"*
(see chapter 7.3.1).

✓ *Heat quantity activated, see "Activating a function"*
(see chapter 7.3.1).

▶ ▽: press button.
  ⇨ *The display for setting the flow rate determination method and the glycol proportion appears.*

▶ **SET:** press button.
  ⇨ *The flow rate determination method flashes in the display.*

▶ △▽: choose between "Pulse generator", use of a "Direct Sensor", or "Without flow sensor".

▶ **SET:** press button to confirm.
  ⇨ *The pulse value (if "Pulse generator" is selected) or sensor type (if "Direct Sensor" is selected) flashes in the display.*

▶ △▽: enter the value or type for the selected flow rate sensor.
  • for "Pulse generator", see chapter 15.3 "Parameter values for functions"
  • for "Direct Sensor", enter the sensor type
  • for "Without flow sensor", this step is dispensed with

▶ **SET:** confirm the value.
  ⇨ *"Glycol proportion" flashes in the display.*

▶ △▽: set the value.

▶ **SET:** press button to confirm.
  ⇨ *The settings are saved.*

Allocating inputs for temperature sensors

▶ ▽: press button.
  ⇨ *The display for setting the temperature inputs appears.*

▶ **SET:** press button.
  ⇨ *"T" flashes in the display (input for supply temperature).*

▶ △▽: choose the desired input.

▶ **SET:** press button to confirm.
  ⇨ *"T" flashes in the display (input for return temperature).*

▶ △▽: choose the desired input.

▶ **SET:** press button to confirm.

Display: 3.6.2

[Impulse generator]

Display: 3.6.3

[hot]
[cool]

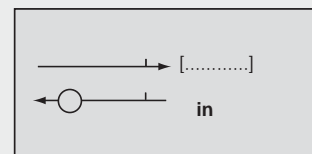## Determining the flow rate for the connected solar circuit pumps

NOTE

The following settings are only possible with the flow rate determination method "Without flow sensor".

✓ *Flow rate determination method set to "Without flow sensor".*

▶ ▽: press button.

⇨ *The display for setting the min/max flow rate appears.*

▶ **SET:** press button.

⇨ *The "max" value flashes in the display and the pump begins to run at maximum speed.*

▶ The flow rate value must now be read at the pump assembly's flow rate display.

▶ △▽: enter the flow rate value.

▶ **SET:** press button to confirm.

⇨ *The "min" value flashes in the display and the pump begins to run at minimum speed.*

▶ The flow rate value must now be read at the pump assembly's flow rate display.

▶ △▽: enter the flow rate value.

▶ **SET:** press button to confirm.
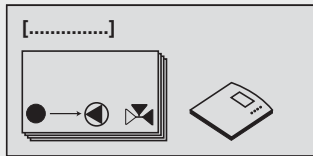

Display: 3.6.4

[Flow rate]

NOTE

• If other solar circuit pumps (e.g. east/west roof system) are connected to the controller, the flow rate for these pumps must be determined and entered as described here.

• If the minimum pump speed in the "Parameters" menu, or the pump level at the pump, is changed at a later point in time, the flow rate must be determined and set once more for more precise calculation of the heat quantity.

• If the collector is in a stagnant state, pump starts are blocked in order to prevent damage. A corresponding information window is displayed.
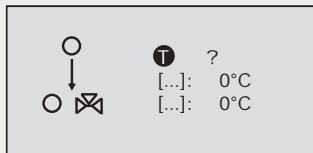
[..............]

Display: 3.7

[Thermostat]

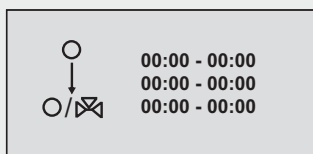## 7.3.8 Thermostat function

This function allows a controller output to be controlled depending on a pre-defined temperature range. Depending on the temperature setting, the thermostat function can be activated either when the temperature falls below (heating) or rises above (cooling) a certain level.

If "on" value is higher than "off" value: if the temperature exceeds the defined "on" value, the output is switched on until the temperature falls below the "off" value.

If "on" value is lower than "off" value: if the temperature falls below the defined "on" value, the output is switched on until the temperature rises above the "off" value.

It is also possible to limit the thermostat function to specific times.

Defining the input and temperature values

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Thermostat activated, see "Activating a function" (see chapter 7.3.1).*

✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*

Display: 3.7.3

[on]
[off]

▶ ▽: press button.
  ⇨ *The display for setting the temperature input and the "on" and "off" values appears.*

▶ **SET:** press button.
  ⇨ *"T" flashes in the display (temperature input).*

▶ △▽: choose the desired input.

▶ **SET:** confirm the input.
  ⇨ *The "on" value flashes in the display.*

▶ △▽: set the "on" value.

▶ **SET:** press button to confirm.
  ⇨ *The "off" value flashes after confirmation of the "on" value.*

▶ △▽: set the "off" value.

▶ **SET:** press button to confirm.
  ⇨ *The settings are saved.*

NOTE

The "on" and "off" values must not be equal, as otherwise the thermostat remains inactive.

Activating time control

▶ ▽: press button.
  ⇨ *The "Time controlled" display appears.*

Display: 3.7.4

[Time controlled]

▶ **SET:** press button.
  ⇨ *Time control is activated.*

▶ ▽: press button.
  ⇨ *The display for setting the duration appears.*

▶ **SET:** press button.
  ⇨ *The time value flashes.*

Display: 3.7.4.1

▶ △▽: set the time value.

▶ **SET:** confirm the value and go to the next value.
  ⇨ *The settings are saved.*

NOTE

The switch-on time must always be before the switch-off time. There-fore, when the switch-on value is being adjusted, the switch-off value will also be changed to a later time if necessary. Adjusting the switch-off value to a time before the switch-on value is blocked.

7.3.9   Difference thermostat function

This function allows a controller output to be controlled depending on a pre-defined temperature difference.

When the temperature difference exceeds the defined "on" value, the output is switched on until the temperature difference falls below the "off" value. For optimised functionality, unloading of the heat source can be limited to a particular temperature range, and loading of the heat target can be limited to a maximum value.

It is also possible to limit the difference thermostat function to specific times.

Defining the inputs and the switching values

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Difference thermostat activated, see "Activating a function" (see chapter 7.3.1).*

✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*

▶ ▽: press button.
  ⇨ *The display for setting the temperature inputs and the switching values appears.*
▶ **SET:** press button.
  ⇨ *"T" flashes in the display (temperature input for the heat source).*
▶ △▽: choose the (heat source's) input.
▶ **SET:** press button to confirm.
  ⇨ *"T" flashes in the display (temperature input for the heat target).*
▶ △▽: choose the (heat source's) input.
▶ **SET:** press button to confirm.
  ⇨ *The "on" value flashes after confirmation of the heat target input.*
▶ △▽: set the "on" value.
▶ **SET:** press button to confirm.
  ⇨ *The "off" value flashes after confirmation of the "on" value.*
▶ △▽: set the "off" value.
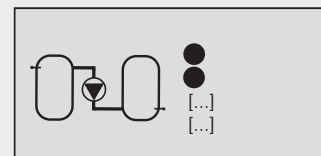▶ **SET:** press button to confirm.
  ⇨ *The settings are saved.*

Defining limits for the heat source

▶ ▽: press button.
  ⇨ *The display for setting the limits (max, min) of the heat source appears.*
▶ **SET:** press button.
  ⇨ *"max" flashes in the display (heat source's maximum value).*
▶ △▽: set the maximum value.
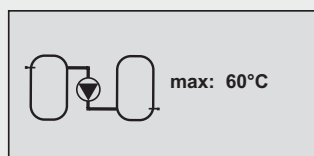▶ **SET:** press button to confirm.
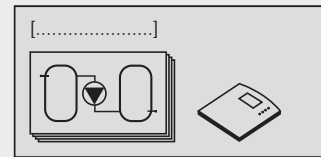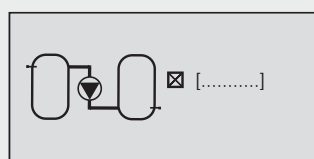
Display: 3.8
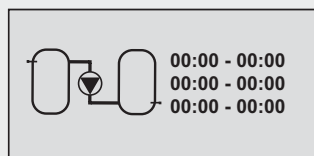[Difference thermostat]

Display: 3.8.3
[on]
[off]

max: 100°C
min: 0°C
Display: 3.8.4

⇨ *"min" (heat source's minimum value) flashes after confirmation of the maximum value.*

▶ △▽: set the minimum value.

▶ **SET:** press button to confirm.

⇨ *The settings are saved.*

Defining limits for the heat target

▶ ▽: press button.

⇨ *The display for setting the limit of the heat target appears.*

▶ **SET:** press button.

⇨ *"max" flashes in the display (heat target's maximum value).*

▶ △▽: set the maximum value.

▶ **SET:** press button to confirm.

Activating time control

▶ ▽: press button.

⇨ *The "Time controlled" display appears.*

▶ **SET:** press button.

⇨ *Time control is activated.*

▶ ▽: press button.

⇨ *The display for setting the duration appears.*

▶ **SET:** press button.

⇨ *The time value flashes in the display.*

▶ △▽: set the time value.

▶ **SET:** confirm the value and go to the next value.

⇨ *The settings are saved.*

NOTE

The switch-on time must always be before the switch-off time. Therefore, when the switch-on value is being adjusted, the switch-off value will also be changed to a later time if necessary. Adjusting the switch-off value to a time before the switch-on value is blocked.

max: 60°C

Display: 3.8.5

⊠ [...........]

Display: 3.8.6

[Time controlled]

00:00 - 00:00
00:00 - 00:00
00:00 - 00:00

Display: 3.8.6.1

7.3.10 Time function

This function allows a controller output to be controlled depending on a predefined time range.

Setting the time window

✓ "*Functions*" *submenu selected, see* "*Selecting a function*" *(see chapter 7.3.1).*

✓ *Time function activated, see* "*Activating a function*" *(see chapter 7.3.1).*

✓ *Outputs selected, see* "*Selecting an output*" *(see chapter 7.3.1).*

▶ ▽: press button.
  ⇨ *The display for setting the duration appears.*

▶ **SET:** press button.
  ⇨ *The time value flashes in the display.*

▶ △▽: set the time value.

▶ **SET:** confirm the value and go to the next value.
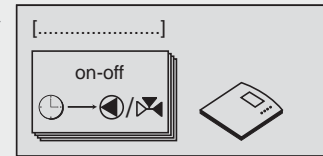 ⇨ *The settings are saved.*

NOTE

The switch-on time must always be before the switch-off time. Therefore, when the switch-on value is being adjusted, the switch-off value will also be changed to a later time if necessary. Adjusting the switch-off value to a time before the switch-on value is blocked.

7.3.11 Interval function

With some types of collector, the collector's construction does not allow the temperature to be recorded at the appropriate location. In these cases, the solar circuit must be briefly activated at regular intervals to transmit the actual heat from the collector pipe to the collector sensor. When the interval function is activated, the controller automatically switches the pump on according to the settings.

Setting the interval function

✓ "*Functions*" *submenu selected, see* "*Selecting a function*" *(see chapter 7.3.1).*

✓ *Interval activated, see* "*Activating a function*" *(see chapter 7.3.1).*

▶ ▽: press button.
  ⇨ *The display for setting a time window, the interval time, and the test time appears.*

▶ **SET:** press button.
  ⇨ *The time window's start time flashes in the display.*

▶ △▽: set the start time.

▶ **SET:** confirm the value and go to the next value.
  ⇨ *After confirmation of the time window, the "Interval" duration (the time between the tests) flashes.*

▶ △▽: set the interval duration.

▶ **SET:** press button to confirm.
  ⇨ *After confirmation of the "Interval" duration, the "Test" duration (duration for which the pump is switched on) flashes.*
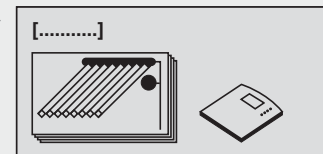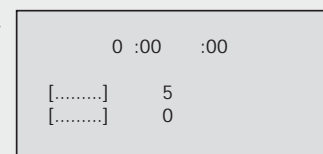
▶ △▽: set the test duration.

Display: 3.9 [Time function]

Display: 3.9.3

Display: 3.10 [Interval]

Display: 3.10.2 [Interval] [Test]

▶ **SET:** press button to confirm.
⇨ *The settings are saved.*

NOTE

The switch-on time must always be before the switch-off time. Therefore, when the switch-on value is being adjusted, the switch-off value will also be changed to a later time if necessary. Adjusting the switch-off value to a time before the switch-on value is blocked.

[..............................]
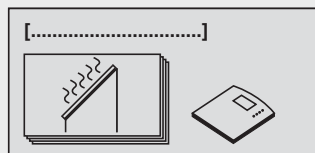
Display: 3.11

[Stagnation reduction]

7.3.12 Stagnation reduction function

This function delays the end of the storage tank's loading phase in order to reduce, or even to avoid, the system's stagnation times at high temperatures. This causes the pump to be stopped repeatedly, and only briefly switched on again when high collector temperatures arise. With higher collector temperatures, the efficiency decreases significantly, thus loading takes longer. This delays the beginning of any stagnation time. Stagnation reduction can only be activated or deactivated.

NOTE

It is possible that this causes the storage tank to be loaded with a higher solar temperature. However, the set maximum storage tank temperature always has priority. This continues to be observed, as do other safety limits.

Activating the stagnation reduction function

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*
✓ *Stagnation reduction activated, see "Activating a function" (see chapter 7.3.1).*

7.3.13 Holiday/recooling function

If the user extracts too little hot water, or none at all (e.g. during holidays), a completely heated storage tank can cause the solar energy system to begin evaporation prematurely, and the system is thus subjected to a higher thermal load.

When the holiday function is activated, and the temperature in the storage tank reaches 10 K below the set maximum storage tank temperature, the controller attempts to systematically unload the lower part of the storage tank at night, until the set minimum storage tank temperature is reached.

This function can be set for a specific period of time.

Defining the minimum storage tank temperature

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Holiday function/recooling activated, see "Activating a function" (see chapter 7.3.1).*

▶ ▽: press button.
  ⇨ *The display for setting the minimum storage tank temperature appears.*

▶ **SET:** press button.
  ⇨ *The min value flashes.*

▶ △▽: set the minimum temperature value for the storage tank.

▶ **SET:** press button to confirm.

▶ ▽: press button.
  ⇨ *The display for setting the time period appears.*

▶ **SET:** press button.
  ⇨ *The start year flashes.*

▶ △▽: set the year.

▶ **SET:** confirm value and change to the month.
  ⇨ *The start month flashes.*

▶ △▽: set the month.

▶ **SET:** confirm value and change to the day.
  ⇨ *The start day flashes.*

▶ △▽: set the day.

▶ **SET:** confirm value and change to the year.
  ⇨ *The end year flashes.*

▶ △▽: set the year.

▶ **SET:** confirm value and change to the month.
  ⇨ *The end month flashes.*

▶ △▽: set the month.

▶ **SET:** confirm value and change to the day.
  ⇨ *The end day flashes.*

▶ △▽: set the day.

▶ **SET:** press button to confirm.
  ⇨ *The settings are saved.*

NOTE

This function should only be activated during long periods of absence. Please check whether this function has been deactivated once again after your return (parasol symbol is no longer displayed), in order not to waste energy unnecessarily via the collector circuit.
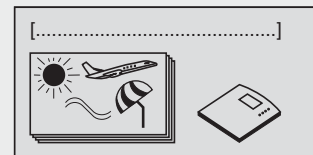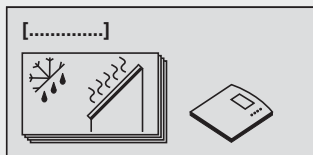

Display: 3.12

[Holiday function/
recooling]

min: 35°C

Display: 3.12.2

17.12.2007 - 24.12.2007

Display: 3.12.3

7.3.14 Frost protection function

Display: 3.13

[Frost protection]

When the frost protection function is activated, the solar circuit pump is switched on as soon as the collector temperature sinks below +5 °C. This causes heat to be pumped through the collector from the lower part of the storage tank in an attempt to prevent the collector from freezing.

If the collector reaches a temperature of +7 °C, the pump is switched off again.

This function is only useful in systems without anti-freeze in the heat transfer fluid.

The frost protection function can only be activated or deactivated.

Activating the frost protection function

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*
✓ *Frost protection function activated, see "Activating a function" (see chapter 7.3.1).*

⚠CAUTION

System can freeze despite the activated frost protection function!

- During a power outage (frost protection function does not operate)
- In the event of a break or short circuit in a collector sensor or cable
- During long-term periods of frost (due to restricted water tank heat storage)
- If collectors are mounted in locations exposed to wind
- ▶ If frost is expected for a long period of time, only operate the system with heat transfer fluid. It is recommended to generally use heat transfer fluid with anti-freeze for solar energy systems.

7.3.15 Anti-legionella function
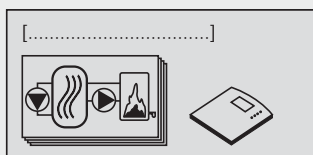
Display: 3.14

[Anti-legionella function]

The anti-legionella function is a precautionary measure to safeguard drinking water hygiene. For this purpose, the controller monitors the temperature in storage tank 1. If the set temperature level was not reached within the past 24 hours by means of the solar feed, then the content of the storage tank will be circulated at the set time by a pump. This is designed to ensure that the temperature of the entire content of the storage tank is raised by back-up heating. Back-up heating can be initiated through the second selected output. If the heating system controls have a corresponding integrated function, then back-up heating can also be performed on a stand-alone basis. In the case of stand-alone back-up heating, it is important to ensure that the corresponding heating system function has been activated and that this operates synchronically with the anti-legionella function. Once storage tank 1 reaches the necessary temperature, the circulation pumps of the plate heat exchanger or of the circulation circuit are activated, if these are available.

NOTE

Risk to health through limited effectiveness of the anti-legionella function! Check anti-legionella function manually with the thermostat at the time of commissioning.

⚠ CAUTION

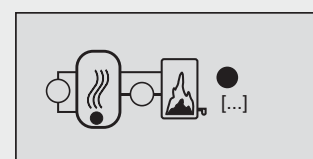**Risk of scalding by hot water temperatures above 60 °C!**

• Perform anti-legionella function only outside normal operating hours.

• Inform house residents about the timeframe of the anti-legionella function.

Activating the Anti-legionella function

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

✓ *Anti-legionella function activated, see "Activating a function" (see chapter 7.3.1).*

✓ *Outputs selected, see "Selecting an output" (see chapter 7.3.1).*

▶ ▽: press button.
  ⇨ *Display to set the temperature input and the temperature required to suppress legionella is shown.*

▶ **SET:** press button.
  ⇨ *"T" flashes in the display (storage tank temperature input).*

▶ △▽: choose the desired input.

▶ **SET:** press button to confirm.
  ⇨ *The anti-legionella temperature for the storage tank flashes.*

▶ △▽: set the anti-legionella temperature for the storage tank.

▶ **SET:** press button to confirm.

▶ ▽: press button.
  ⇨ *Display for selection of the start and end times appears.*

▶ **SET:** press button to confirm.
  ⇨ *The hour value of the start time flashes.*

▶ △▽: set the hour value of the start time.

▶ **SET:** press button to confirm.
  ⇨ *The minute value of the start time flashes.*

▶ △▽: set the minute value of the start time.

▶ **SET:** press button to confirm.
  ⇨ *The hour value of the end time flashes.*

▶ △▽: set the hour value of the end time.

▶ **SET:** press button to confirm.
  ⇨ *The minute value of the end time flashes.*

▶ △▽: set the minute value of the end time.

▶ **SET:** press button to confirm.

Display: 3.14.3

[Target]

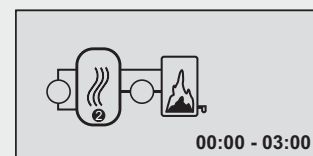Display: 3.14.4

00:00 - 03:00

NOTE

The duration of the anti-legionella function can be set between 1 hour and 3 hours 59 minutes. Programming a time period which goes beyond midnight (24.00) is not possible.
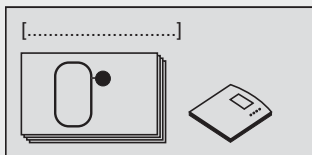
Display: 3.15

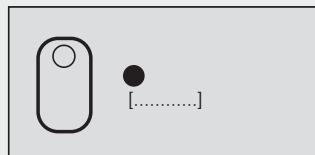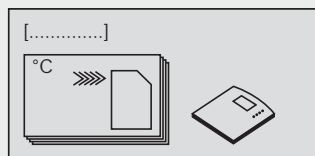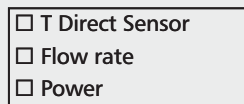[Display storage tank top]

Display: 3.15.2/3

[storage tank]
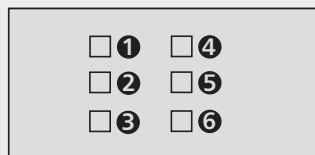
7.3.16 Display storage tank top function

The display storage tank top function serves merely as an additional display and has no effect on control.

✓ *"Functions" submenu selected, see "Selecting a function"*
(see chapter 7.3.1).

✓ *Display storage tank top activated, see "Activating a function"*
(see chapter 7.3.1).

▶ ▽: press button.
   ⇨ *The display for selecting the storage tank and the corresponding temperature sensor appears.*

▶ **SET:** press button.
   ⇨ *The upper temperature sensor flashes in the display.*

▶ △▽: set the temperature sensor.

▶ **SET:** press button to confirm.
   ⇨ *The storage tank selection flashes in the display.*

▶ △▽: set the storage tank.

▶ **SET:** press button to confirm.

NOTE

There are two "storage tank top" settings available, which are independent of one another.

Display: 3.16

[Data logger]

7.3.17 Data logger function

With this function (see chapter 9) the following controller data can be stored on an SD card.
- Temperature of all sensors
- Flow rate of the volumetric flow meter
- Output (current value of the heat meter)
- Operating status of the outputs

NOTE

Only the data of the selected measurement values are stored.

✓ *"Functions" submenu selected, see "Selecting a function"*
(see chapter 7.3.1).

✓ *Data logger activated, see "Activating a function"*
(see chapter 7.3.1).

▶ ▽: press button.
   ⇨ *Display for the selection of the temperature sensors appears.*

Display: 3.16.2

NOTE

The temperature sensors T1 to T6 can be selected here.

▶ △▽: select a temperature sensor.

▶ **SET:** press button to confirm.
   ⇨ *The selected temperature sensors are indicated.*

▶ ▽: press button until the next page appears.
   ⇨ *Display for the selection of additional measurement values appears.*

☐ T Direct Sensor
☐ Flow rate
☐ Power

Display: 3.16.3

NOTE

The temperature of the Direct Sensor as well as the flow rate and the output of the measurement of heat quantities can be selected here.

▶ △▽: select additional measurement values.

▶ **SET:** press button to confirm.

⇨ *The selected measurement sensors are indicated.*

▶ ▽: press button until the next page appears.

⇨ *Display for the selection of the outputs to be recorded appears.*

NOTE

Outputs R1 to R3 as well as the alarm output can be selected here.

▶ △▽: choose the desired outputs.

▶ **SET:** press button to confirm.

⇨ *The selected outputs are indicated.*

▶ ▽: press button until the next page appears.

⇨ *The interval time appears.*

▶ **SET:** press button.

⇨ *The number of minutes flashes in the display.*

▶ △▽: set the interval time.

▶ **SET:** press button to confirm.

### 7.3.18 Alarm output function

The alarm output is always switched on when the controller detects a pre-selected type of error (sensor error, int. clock error, system error, night circulation, piping error, anti-legio. error). For connection of the alarm output, see chapter 4.5.4.

✓ *"Functions" submenu selected, see "Selecting a function" (see chapter 7.3.1).*

▶ ▽: press button.

⇨ *The error selection display appears.*

▶ △▽: select an error type.

▶ **SET:** press button to confirm.

⇨ *The selected errors are indicated.*

Definition of errors

| Error type	Description
Sensor error	Sensor cable short circuit, interruption of sensor cable, or no sensor connected (see chapter 12).
Int. clock failure	For instance after a long power outage
System error	Volume flow fault in solar circuit or secondary circuit (see chapter 12)
Night circulation	Gravity circulation causes the collector to be heated at night (see chapter 12).
Piping error	Collector pipes may be wrong way round (see chapter 12).
Anti-legionella error	The set temperature was not achieved within the set timeframe (see chapter 12).
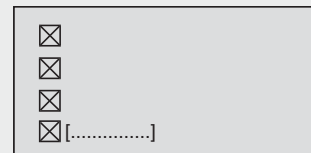
Display: 3.16.4

▶ [Alarm output]

15 min. interval

Display: 3.16.5
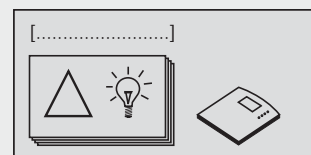
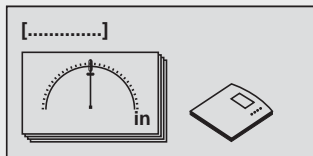Display: 3.17

[Alarm output]

Alarm if:
☐ Sensor error
☐ Int. clock failure
☐ System error

Display: 3.17.1

Alarm if:
☑ Night circulation
☐ Piping error
☐ Anti-legio. error

Display: 3.17.2

7.4   Parameters

In the factory, the controller is configured in such a manner that it can be used in most applications without changes to these values.

All parameters can be modified to a certain extent to suit the individual requirements of the system. If modifications are realised, the operating data of the solar components used must be observed!

NOTE

The parameter settings depend on the solar energy system chosen. This means that not all parameter settings are available for all types of solar energy systems.

The following parameters can be accessed and adjusted:
- Maximum temperature storage tank 1, storage tank 2, storage tank 3 or swimming pool
- Switch-on temp. difference solar 1, solar 2 or solar 3
- Switch-off temp. difference solar 1, solar 2 or solar 3
- Maximum collector temperature
- Minimum collector temperature
- Switch-on temperature difference return increase
- Switch-off temperature difference return increase
- Maximum temperature loading circuit 1
- Minimum temperature loading circuit 1
- Loading strategy storage tank 1, storage tank 2 or storage tank 3
- RPM control pump R1 or pump R2

7.4.1   Accessing and adjusting parameters

Accessing parameters

▶ **SET:** press button for approx. 2 sec.
▶ △▽: select the menu item "Parameters".
▶ **SET:** open the submenu.
▶ △▽: select a parameter.

Setting a parameter value

✓ *Submenu "Parameters" selected (see "Accessing parameters").*

▶ **SET:** press button.
   ⇨ *The display with the selected system and the corresponding parameter value flashes.*
▶ △▽: set the value.
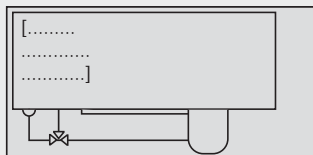▶ **SET:** press button to confirm.

Exiting the parameter

▶ **ESC:** press button to confirm.

NOTE

The "loading strategy" and "RPM control" parameters can be adjusted as follows.

Display: 4
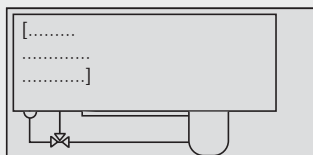
[Parameters]

Display example

[Maximum storage tank 1 temperature]

Display example

[loading strategy of storage tank 1]

7.4.2 Setting the loading strategy parameter

✓ *Access the "loading strategy" parameter, (see chapter 7.4.1).*

▶ **SET:** press button.
  ⇨ *The display for setting the temperature differential control or target temperature control appears.*

Choosing loading strategy between temperature differential control and target temperature control

▶ **SET:** press button for approx. 2 sec.
  ⇨ *Select either temperature differential control (dT) or target temperature control (T).*

Setting the temperature differential value or target temperature value

▶ **SET:** press button.
  ⇨ *The temperature differential value flashes in the display (e.g. dT=8 K).*
▶ △▽: set the temperature differential value.
▶ **SET:** press button to confirm.
  ⇨ *The target temperature value flashes in the display (e.g. T=60 °C).*
▶ △▽: set the target temperature value.
▶ **SET:** press button to confirm.
  ⇨ *The settings are saved.*

7.4.3 Setting the RPM control parameters

✓ *Access the "RPM control" parameters, (see chapter 7.4.1).*

▶ **SET:** press button.
  ⇨ *The display for activating (yes) or deactivating (no) the RPM control is shown.*

Activating or deactivating the RPM control

▶ **SET:** press button for approx. 2 sec.
  ⇨ *Choose between "yes" and "no" for RPM control.*
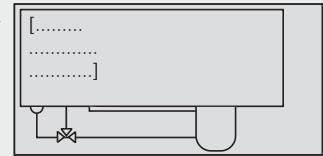
Setting the minimum speed

▶ **SET:** press button.
  ⇨ *The min. RPM value flashes.*
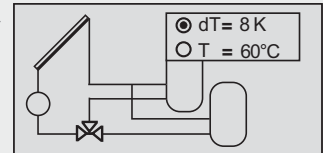▶ △▽: set the minimum speed.
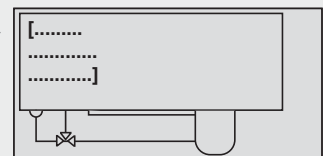▶ **SET:** press button to confirm.
  ⇨ *The settings are saved.*

Display: 4.21
[loading strategy of storage tank 1]

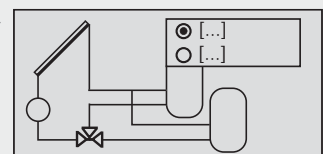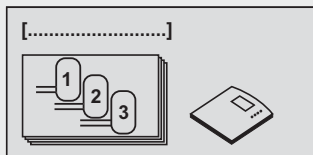Display: 4.21 Settings window

dT= 8 K
T = 60°C

Display: 4.24
[RPM control pump R1]

Display: 4.24 Settings window
[no]
[yes]

7.5   Storage priority

When a 2-storage tank system or a 3-storage-tank system is selected, the storage priority can also be specified.

If storage priority is **activated**, the storage tank sequence can be defined. If it is intended that one of the storage tanks is not to be loaded, this tank can be "removed" from the storage priority.

When storage priority is **deactivated**, the storage tanks will be loaded equally.

NOTE

Special characteristic of seasonal systems: In the case of these systems, the storage priority cannot be activated. Instead, the storage priority load can be defined depending upon the season (summer/winter).

Control

When storage priority is activated, the controller primarily attempts to load the first-priority storage tank. However, if this is initially impossible due to the collector temperature being too low, preference is given to loading a second-priority storage tank, if possible. In this event, the controller conducts regular tests (every 30 minutes) in order to check whether it has become possible to load a first-priority storage tank. This test can take several minutes, as the collector array must heat up sufficiently. On the basis of this heating process, the controller predicts whether it is possible to load a first-priority storage tank in a foreseeable period of time.

When storage priority is deactivated, the controller begins (if possible) to load the coldest storage tank, and loads it until its temperature exceeds that of the other storage tanks. Loading then switches to the other storage tank. Thus, the storage tanks are heated equally, in an alternating manner.

Accessing storage priority

▶ **SET:** press button for approx. 2 sec.

▶ △▽: select the menu item "Storage priority".

Activating/deactivating storage priority

▶ **SET:** press button.
  ⇨ *The display for activating (on) or deactivating (off) storage priority appears.*
▶ **SET:** press button for approx. 2 sec.
  ⇨ *Storage priority is activated or deactivated.*

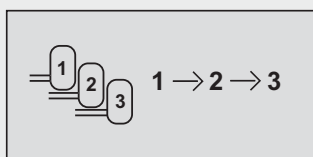### Specifying storage priority (if storage priority is activated)

▶ ▽: press button.
  ⇨ *The display for setting the storage priority appears.*
▶ **SET:** press button.
  ⇨ *The storage priority flashes.*
▶ △▽: set the storage priority.
▶ **SET:** press button to confirm.

Display: 5

[Storage priority]
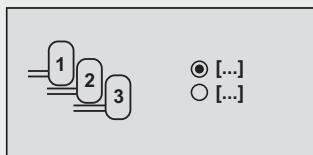
Display: 5.1

[off]
[on]

Display: 5.2

7.6 Language

Accessing and selecting the language

▶ **SET:** press button for approx. 2 sec.

▶ △▽: select menu item "Language".

▶ **SET:** press button.

⇨ *The language display appears.*

▶ **SET:** press button.

⇨ *The set language flashes.*

▶ △▽: select a language.

▶ **SET:** press button to confirm.

7.7 Factory settings

Resetting the factory settings

▶ **SET:** press button for approx. 2 sec.

▶ △▽: select the menu item "Factory settings".

▶ **SET:** press button.

⇨ *The display "Reset all values?" appears.*

▶ **SET:** press button.

⇨ *All values are reset to the factory settings.*
The controller restarts. The controller must now be reconfigured (see chapter 5 "Commissioning").

NOTE

When the controller is reset to "Factory settings", all settings return to the values they had upon delivery of the controller.

The following values are retained:

• The min/max values of the temperature sensors

• The outputs' operating hours

• Max. heat output

• Heat quantities

7.8 Set season

NOTE

This menu item appears only if a seasonal system has been selected.

Selecting a season

▶ **SET:** press button for approx. 2 sec.

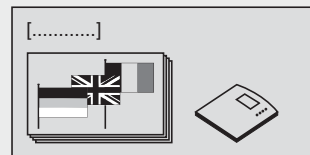▶ △▽: select the menu item "Set season".

▶ **SET:** press button.

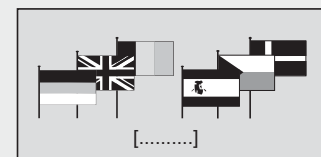⇨ *Display "Summer/Winter" appears.*

▶ **SET:** press button.

⇨ *The selected season is changed.*
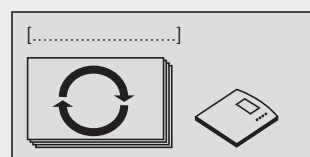
▶ **ESC:** finish the settings.
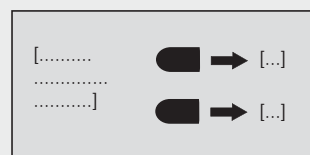
Display: 6
[Language]
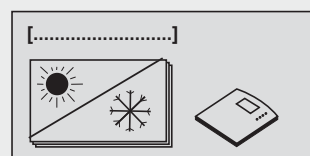
Display: 6.1
[Deutsch]

Display: 7
[Factory settings]

Display: 7.1
[Reset all   [yes]
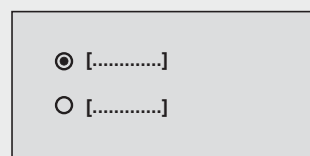values
?]   [no]

Display: 8
[Set season]

Display: 8.1
[Summer]
[Winter]

8   Automatic mode

Symbols

In "Automatic" operation of the controller, the status display with the selected solar energy system and other set functions are shown on the display. You can access the values of the individual sensors, the outputs' running times, and additionally set functions, by using the operating buttons (arrow up and arrow down). Other symbols provide information on the condition of the solar energy system.

The various symbols are displayed as soon as additional functions are activated or when values exceed or fall below parameter values. The display screen below shows all symbols simultaneously as an example. In practice, they appear in various combinations.
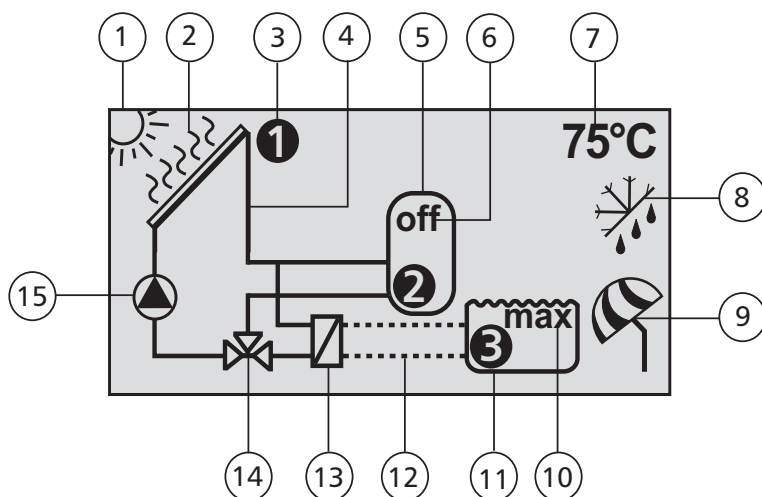
1	Symbol for solar circuit's switch-on condition fulfilled	9	Symbol for the activated holiday/recooling function
2	Symbol for maximum collector temperature reached	10	Symbol (max) for maximum storage tank and swimming pool temperature reached
3	Symbol for the currently selected temperature sensor	11	Symbol for swimming pool
4	Symbol for the solar circuit	12	Symbol for stand-alone operation of the swimming pool loading circuit
5	Symbol for the storage tank	13	Symbol for external heat exchanger
6	Symbol (off) for deactivated storage tank	14	Symbol for 3-way switching valve
7	Display of the current measured value such as temperature values and outputs' operating hours	15	Symbol for pump
8	Symbol for the activated frost protection function		

8.1 Status display

Switching the display screen

▶ △▽: press button.
   ⇨ *The following values and displays appear one after another:*
• The temperature sensors of the system set, and the corresponding current temperature values
• Outputs and corresponding running times
• Functions, and their additional measured values
   ⇨ *The additionally set functions are displayed.*
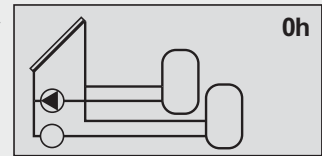
Display example

8.2 Temperature sensor min/max display

Display of the min/max values

▶ △▽: choose the desired temperature sensor.
▶ **SET:** access the information window.
   ⇨ *The min/max values are displayed.*

Resetting the min/max values

▶ **SET:** press button for 2 sec.
   ⇨ *The min/max values are reset to the current temperature.*

Display example

NOTE

The minimum and maximum values of the connected temperature sensors are always logged and accessible.

The values stored can be reset at any time.

8.3 Operating hours display for pumps and switching valves

Display of the operating hours

▶ △▽: choose the desired pump or valve.
▶ **SET:** access the information window.
   ⇨ *The hours-of-operation logger is displayed.*
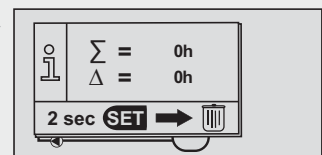
Display example

Resetting the operating hours

✓ *Operating hours called up.*

▶ **SET:** press button for approx. 2 sec.
   ⇨ *The delta value (Δ) is reset to zero.*

The outputs' operating hours are always stored.

Here, a distinction is made between total operating hours ($\sum$) and delta operating hours (Δ). The total operating hours cannot be reset. However, delta operating hours can be reset to zero at any time.

9 Data logger

An SD card enables you to save all the measurement data collected by the controller over a long period of time. The data logger enables detailed system control e.g. chronological sequence of yields. In addition, you can use the stored measurements to optimise the settings of the solar energy system and thus achieve the highest possible efficiency of the system.

9.1 Handling the SD card

Insert SD card with the contact surface at the front.

All standard SD cards can be used, including 2 GB. The SD cards must be formatted with the FAT16 format and there should be no existing data on the SD card.

To insert an SD card in your controller, push the SD card, with the contact surface at the front, into the side slot of the controller until the card engages.
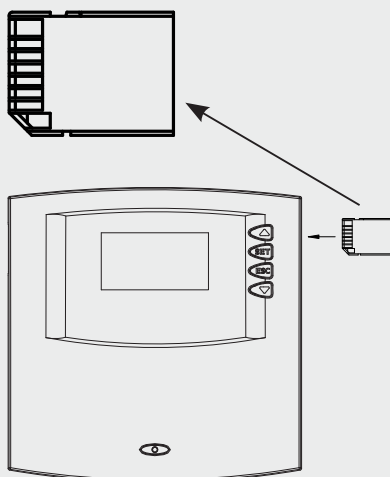
To remove the card press it slightly inwards until it is released and pushed out by spring-action. The card can now be taken out.

Before you take the card out make sure that the data logger function is switched off (see chapter 7.3.17). This will prevent any possible loss of data.

NOTE

SD cards are very sensitive. Ensure that you do not soil the contacts and that no pressure is applied to the card. Observe the instructions of the card manufacturer.

The controller manufacturer accepts no responsibility for claims for damages resulting from defective or lost data.

9.2 Display screen

The controller can recognise the different statuses of the SD card:

An hourglass symbol shows that the controller is accessing the SD card and calculating the remaining days. During this time keypad entries are not possible and the display is not updated. During this time the outputs remain at the status they were before the controller accessed the SD card.

The hourglass symbol is displayed after the following actions:

- Inserting an SD card
- Changing the interval time for data collection
- Changing the date
- Switching on the controller
- Resetting the operating switch from "OFF" to "Automatic" after formatting
- Switching on the data logger function
- Changing the clock from 23:59 to 00:00

If an SD card is inserted in the controller, the "Data logger" function is activated and no SD card error has occurred, a window appears in the status display in which the data transfer from the controller to the SD card is displayed. This is illustrated by an animation. A help window can

be accessed by pressing the SET button. Here it is pointed out that the data logger function should be switched off before the removal of the SD card in order to exclude the possible loss of data. The help window is closed again by pressing any button.

For calculating the remaining days it is assumed that all selectable data will be collected.

Examples for calculating the remaining days:

Interval time 1 minute, memory capacity 1 GB: approx. 13 years
Interval time 1 minute, memory capacity 128 MB: approx. 2 years
Interval time 5 minutes, memory capacity 1 GB: approx. 65 years
Interval time 5 minutes, memory capacity 128 MB: approx. 10 years

If the memory capacity on the SD card is not sufficient for a new data collection, then the oldest month folder including its contents is deleted (so-called ring buffer). "ring buffer" appears instead of the display of the remaining days.

Errors that can occur in the connection with the SD card are shown by corresponding error displays. See chapter 11 for description and measures.

9.3 Formating

Note that all the data stored on the card is deleted when you reformat the card. The manufacturer does not accept any responsibility for the loss of data.

9.3.1 Formatting the SD card with the computer

SD cards can be formatted with any standard PC or laptop with an appropriate reading point.

NOTE

The SD card must be formatted with the FAT16 format. This is equivalent to the FAT format in Windows XP.

9.3.2 Formatting the SD card with the computer

✓ *"Functions" submenu selected, see "Selecting a function"
(see chapter 7.3.1).*

✓ *Data logger activated, see "Activating a function"
(see chapter 7.3.1).*

⇨ *The message "SD card not inserted" is displayed.*

▶ Insert SD card.

▶ If the following message is shown:

⇨ *"Permissible size: max. 2 GB, Formatting: FAT16 only", the SD card must be formatted.*

NOTE

The SD card can only be formatted in the controller if this error message is displayed.

[Remain. days]
[Help]

[ring buffer]
[Help]

[SD card error:
SD card
not inserted]

[SD card error:
Permissible size max. 2 GB
Formatting: FAT16 only]

```
[.........
...........        ◖ ➡ [...]
..........
...............    ◖ ➡ [...]
............]

Format           [yes]
SD card?
Warning:         [no]
all data
will be
deleted!]
```
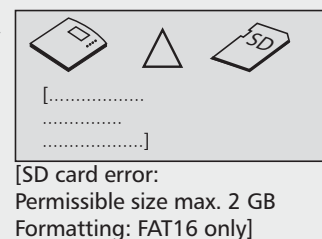
▶ Push the operating switch downwards (position "OFF").
 ⇨ *The following message appears with the formatting prompt* "*Format SD card? Warning: all data will be deleted!*" *Warning: all data will be deleted!*"

▶ **SET:** press to start formatting,
  ESC: press to cancel.
 ⇨ "*SDMC: formatting…*" *appears during formatting.*
 ⇨ "*SDMC: format OK"* *appears after the formatting has been completed.*

▶ Push the operating switch back to the middle position ("Automatic" position).

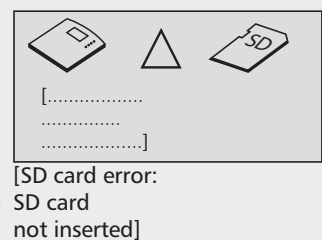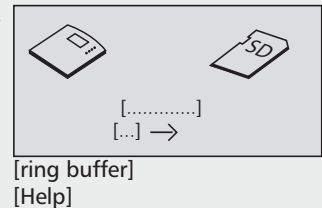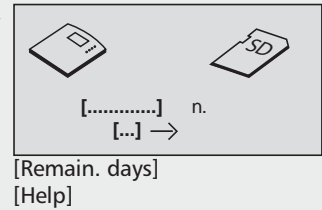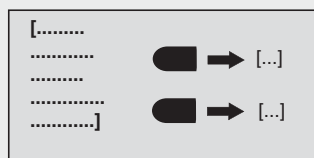## NOTE

If formatting of the SD card fails, the message "SDMC: format error" appears in the display (see information windows).

If no error message is displayed the controller starts automatically with the data recording (see chapter 9.2).

In the event of another error message see information windows, chapter 12.

9.4 Data evaluation

The controller automatically creates the following folder structure on the SD card.

A separate folder is created on the SD card for every year. This can contain up to 12 month folders. The day files are stored in the month folders. The name of a day file is composed of the year, month and day, e.g.: of 18 February 2008: "20080218.csv".
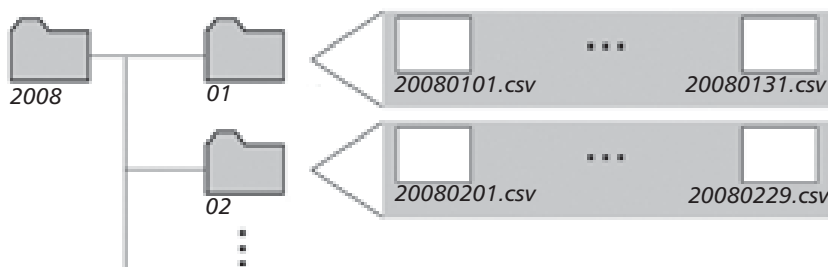
Explanation of the column arrangement if a day file is opened with a spreadsheet programme, e.g. Excel:

 1. column: date and time
 2.-7. column: temperature sensor measurements (T1 to T6 in °C)
 8. column: temperature of the Direct Sensor (Tds in °C)
 9. column: flow rate of the volumetric flow meter (V in l/min)
 10. column: output of the measurement of heat quantities (P in W)
 11-13. column: operating status of the outputs (R1 to R3 in %)
 14. column: operating status of the alarm output (R! in %)

NOTE

Information on further programmes for data evaluation can be obtained from your dealer.

10 Service

Updating the controller software

The controller is programmed in the factory with the latest controller software at the time of production. Therefore, the software does not usually have to be updated.

However, if you would like to use newer controller software or if an update is recommended for technical reasons, you can transfer new controller software to the controller via the RS232 interface.

Further information in this regard can be obtained from your dealer.

11 Fault finding

The controller is a quality product, conceived for years of continuous trouble-free operation. If a problem occurs, the cause of the problem often lies not in the controller but in the peripheral components. The following description of some causes of problems should help the installer and operator to isolate the problem so that the system can be repaired as quickly as possible and to avoid unnecessary costs. Of course, not all possible causes of problems can be listed here. However, here you will find the most common causes of problems that cover the majority of possible faults. Only return the controller when you are absolutely sure that none of the problems listed below is responsible for the fault.

⚠ DANGER

Risk of death by electrocution!

▶ All work on an open controller must be performed by professional personnel.

▶ Remove the controller from the power supply before opening the case.

11.1 Causes of problems

Controller does not appear to function at all:

Secondary symptoms	Possible cause	Procedure
• Display shows nothing. • No display illumination	Controller power supply is interrupted.	• Check the controller power cable. • Check the fuse for the power supply. • Check the fuse at the controller (replacement fuse is located in the case).

The solar pump does not operate, despite the fact that the switch-on conditions are satisfied:

Secondary symptoms	Possible cause	Procedure
The pump symbol in the display rotates.	• Pump power supply is interrupted. • Pump has seized up.	• Check the pump power cable. • Check the fuse in the controller (replacement fuse is located in the case). • Get the pump working again, replace if necessary.
The pump symbol in the display does not rotate.	• The maximum storage tank temperature has been reached. • The maximum collector temperature has been reached. • In multi storage tank systems: the system has stopped due to a priority test. • The minimum collector temperature has not been reached. • The maximum loading temperature has been reached. • Stagnation reduction activated • Storage tank deactivated	• No fault
• The pump symbol in the display does not rotate. • The display illumination is red. • A tool symbol flashes in the display.	The operating switch is set to manual operation and the pump output is set to „off".	• Set the operating switch to automatic operation.
• The pump symbol in the display does not rotate. • The display illumination flashes red.	Short circuit or interruption of a temperature sensor	• On the controller, request the current values from all connected temperature sensors. • Check all defective sensors and/or sensor cable.

The solar pump operates, despite the fact that the switch-on condition is not fulfilled:

Secondary symptoms	Possible cause	Procedure
The pump symbol in the display rotates.	• The interval function is activated. • The holiday function is activated. • The frost protection function is activated. • Blockage protection is activated.	• No fault • Deactivate the relevant function, if necessary.
• Symbol rotates. • Display has a red background. • Tool symbol is visible on the display.	The operating switch is set to manual operation and the pump output is set to „on".	• Set the operating switch to automatic operation.

Solar pump is operating, activation condition is fulfilled, nevertheless, no heat transport in the solar circuit (no "fluid circulation"):

Secondary symptoms	Possible cause	Procedure
The pump symbol in the display rotates.	• Air is in the solar circuit. • The isolating valve is closed. • Limescale/contamination on solar circuit	Check the solar circuit for air. Check the isolating valve. Flush/clean the solar circuit.

Solar pump shows cycle behaviour.

Secondary symptoms	Possible cause	Procedure
	• Temperature difference too small • Collector sensor incorrectly positioned	Adjust temperature difference in the Parameters menu. Check the collector sensor.

11.2 Pt1000 temperature sensor values

A potentially defective sensor can be checked using an ohmmeter. To do this, the sensor must be disconnected, its resistance measured, and the value compared with the figures in the table below. Small deviations are acceptable.

Temperature [°C]	-30	-20	-10	0	10	20	30	40	50	60	70
Resistance [Ω]	882	922	961	1000	1039	1078	1117	1155	1194	1232	1271

Temperature [°C]	80	90	100	110	120	130	140	150	160	170	180
Resistance [Ω]	1309	1347	1385	1423	1461	1498	1536	1573	1611	1648	1685
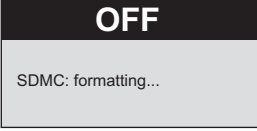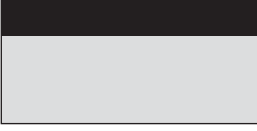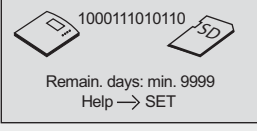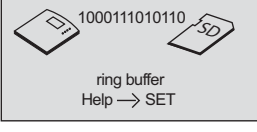
12   Information windows

The following information windows are displayed whenever a function's settings are not complete, activation of a function is not possible, errors occur in the system, or certain functions are currently activated.

Display	Description	Measures
Activation not possible. Settings are incomplete!	Function cannot be activated as the corresponding settings are incomplete. Function was deactivated again.	Check and complete the settings.
Activation not possible. All outputs are occupied!	Function cannot be activated, as all outputs are already occupied.	If the selected layout, or another function, is to be retained, this function cannot be used.
Caution: Diverse settings have to be repeated after changing system !	When changing systems, all settings of functions and parameters are reset.	Settings which are still needed, and which must be configured anew, must be noted down in advance.
Frost protection function and bypass function cannot be activated simultaneously.	Frost protection function and bypass function cannot be activated simultaneously.	Check frost protection concept.
not available for pool systems	Some functions are not available for systems with a swimming pool.	In swimming pool systems, these functions must be dispensed with.
not available for 1-storage systems	It is not possible to access storage priority, as the selected system only has one storage tank.	The setting is not required with this system.
Pumps running due to blockage protection	In order to protect the pumps from mechanical seizure, all pumps are switched on briefly once a day.	–
System recooling in progress	The holiday function is activated. Storage tank is being recooled by the system.	–
Hygiene flushing circulation	System is conducting hygiene-flushing of the circulation pipe.	–
Stagnation reduction is active	„Stagnation reduction" is activated. System is operating at high temperature level.	–

System stopped due to priority test.	The solar circuit has stopped because the controller is conducting a priority test. This test checks whether, instead of the second-priority storage tank, the first-priority storage tank could also be loaded. This test can take several minutes, as the collector array must heat up sufficiently.	–
Solar circuit running due to interval test	Solar circuit is running due to interval test. The collector's heat transfer fluid is being transported to the sensor.	–
Thermal frost protection is active	The solar circuit is running in order to protect the collector from icing up.	–
Volume flow fault solar circuit: check hydraulics! Air in system?	Despite the fact that the pump is running, the temperature difference between the collector and the external heat exchanger is too great. -> Volume flow is too low.	Check the solar circuit's hydraulics, pump, valves, and shut-off devices. If necessary, bleed the system, open the shut-off devices, and flush out blockages.
Volume flow fault secondary circuit: check hydraulics! Air in system?	Despite the fact that the pump is running, the temperature difference between the external heat exchanger and the storage tank is too great. -> Volume flow is too low.	Check the loading circuit's hydraulics, pump, valves, and shut-off devices. If necessary, bleed the system, open the shut-off devices, and flush out blockages.
Night circulation detected. Check non-return valves and the time set!	Gravity circulation is causing the collector to be heated at night.	Check the gravity brake (non-return valve) and the time set in the controller.
Collector connections may be wrong way round. Check hydraulics!	Solar circuit shows „suspicious" cycle behaviour.	Check the collector array's supply and return pipes, and mount them correctly if applicable.
Info: double allocation / conflicting settings	The internal settings check has identified conflicting settings, or double allocation of sensors.	Check the function's time settings. Double allocation of sensors is permitted, and this is only intended as information.
Plausibility check ⇒ user manual: P36	The internal plausibility check has identified conflicting settings.	Look up the error code in the operating instructions (chapter 13) and check/correct the entries.
Fault detected in sensor or sensor cable	A sensor error has been detected.	Locate and check the corresponding sensor(s) in the display menu.
Sensor cable interrupted or no sensor connected !	Sensor cable is interrupted, incorrectly connected, or the sensor is possibly defective.	Check connection and/or sensor cable. Possibly check sensor and sensor cable using an ohmmeter.

Short circuit in sensor cable!	Sensor cable has short-circuited or the sensor is possibly defective.	Check connection and/or sensor cable. Possibly check sensor and sensor cable using an ohmmeter.
Storage tank / pool deactivated due to season or storage priority	Loading of the storage tank/pool was deactivated due to storage priority.	If this is not wanted, loading can be reactivated via storage priority or season selection.
Pump operation not enabled at present	The collector is in a stagnant state, pump starts are blocked in order to prevent damage.	Wait until the collector has cooled sufficiently before setting these values.
Anti-legionella function is active.	The anti-legionella function is activated. Back-up heating operates until the target temperature of the anti-legionella function has been reached.	–
Back-up heating is active.	Back-up heating is active.	–
SD card error: SD card not inserted	Data logger function has been activated, but no SD card has been inserted.	In order to enable data to be stored on the SD card, the SD card needs to be inserted into the controller (see chapter 9.1).
Data-Logger function must be switched on!	SD card has been inserted, but the data logger function has not yet been activated.	Activate the data logger function in order to store data on the SD card (see chapter 7.3.17).
	Controller accesses the SD card. This may take a few seconds.	–
SD card error: SD card is writeprotected	Controller has recognised the write protection on the SD card.	Write protection tab needs to be in the upper position, as shown.
SD card error: SD card cannot be read	Controller is unable to access the SD card.	Use another SD card.
SD card error: Permissible size max. 2GB Formatting: FAT16 only	SD card has been formatted with the wrong format, or has the wrong card size.	Make sure the card is not larger than 2 GB - format the card with FAT16.
Format SD card? Warning: all data will be deleted! SET → yes ESC → no	Use the SET button to start the formatting. Caution: all data on the SD card will be deleted.	–

OFF SDMC: formatting...	Controller performs the formatting.	–
FF fo o	Formatting has failed.	Use another SD card.
	Formatting has been successfully completed.	–
1000111010110 SD Remain. days: min. 9999 Help → SET	Controller stores the data on the SD card. For calculation of the remaining days, see chapter 9.2.	–
1000111010110 SD ring buffer Help → SET	If the free SD card memory is not sufficient for further measurement data storage, then the controller automatically switches to ring buffer operation. This means the respective oldest month folder will be deleted together with its content.	If you want to save the data, remove the SD card as described in chapter 9.1, and save the data on a computer.

13 Plausibility indices

The internal plausibility check ascertains whether conflicting settings have been detected in the controller. In this event, an information window displays an error code. The reasons which cause the information window to appear, along with each corresponding error code, are described in the following table. Check your settings at the controller, and correct them if necessary.

P 1	Maximum temperature storage tank 1 + switch-on temperature difference 1 > maximum collector temperature
P 2	Maximum pool temperature + switch-on temperature difference 2 > maximum collector temperature
P 3	Maximum temperature storage tank 3 + switch-on temperature difference 3 > maximum collector temperature Maximum pool temperature + switch-on temperature difference 3 > maximum collector temperature
P 4	Maximum temperature storage tank 1 + switch-on temperature difference 2 > maximum collector temperature (system with 2 collector arrays)
P 5	Temperature differential control storage tank 1 < switch-off temperature difference 1
P 6	Temperature differential control storage tank 1 < switch-off temperature difference 2 (system with 2 collector arrays)
P 7	Temperature differential control storage tank 2 < switch-off temperature difference 2
P 8	Temperature differential control storage tank 3 < switch-off temperature difference 3
P 9	Temperature differential control storage tank 1 + 5 K < switch-off temperature difference 1 (system with external heat exchanger)
P 10	Temperature differential control storage tank 1 + 5 K < switch-off temperature difference 2 (system with 2 collector arrays and external heat exchanger)
P 11	Temperature differential control storage tank 2 + 5 K < switch-off temperature difference 2 (system with external heat exchanger)
P 12	Target temperature control storage tank 1 < minimum collector temperature
P 13	Target temperature control storage tank 1 > maximum collector temperature
P 14	Target temperature control storage tank 2 < minimum collector temperature
P 15	Target temperature control storage tank 2 > maximum collector temperature
P 16	Target temperature control storage tank 3 < minimum collector temperature
P 17	Target temperature control storage tank 3 > maximum collector temperature
P 18	Target temperature control storage tank 1 + 5 K < minimum collector temperature (system with external heat exchanger)
P 19	Target temperature control storage tank 1 + 5 K > maximum collector temperature (system with external heat exchanger)
P 20	Target temperature control storage tank 2 + 5 K < minimum collector temperature (system with external heat exchanger)
P 21	Target temperature control storage tank 2 + 5 K > maximum collector temperature (system with external heat exchanger)
P 22	Target temperature control storage tank 1 < minimum temperature loading circuit 1
P 23	Target temperature control storage tank 1 > maximum temperature loading circuit 1
P 24	Target temperature control storage tank 2 < minimum temperature loading circuit 1

P 25	Target temperature control storage tank 2 > maximum temperature loading circuit 1
P 26	Target temperature control storage tank 2 < minimum temperature loading circuit 2
P 27	Target temperature control storage tank 2 > maximum temperature loading circuit 2
P 28	Switch-on temperature difference external heat exchanger + maximum temperature storage tank 1 > maximum temperature loading circuit 1
P 29	Switch-on temperature difference external heat exchanger + maximum temperature storage tank 2 > maximum temperature loading circuit 1
P 30	Switch-on temperature difference external heat exchanger + maximum temperature storage tank 2 > maximum temperature loading circuit 2
P 31	Temperature differential control storage tank 1 < switch-off temperature difference external heat exchanger
P 32	Temperature differential control storage tank 2 < switch-off temperature difference external heat exchanger
P 33	Quick charge „OFF" > target temperature control storage tank 1
P 34	Quick charge „ON" and RPM control „OFF"
P 35	Circulation „ON" and no time control and temperature control and pulse control
P 36	Holiday function and anti-legionella function are both activated.
P 37	Holiday function target temperature >= maximum storage tank temperature

14 Legal guarantee

In accordance with German statutory regulations, there is a 2-year legal guarantee on this product for the customer.

The seller will remove all manufacturing and material faults that occur in the product during the guarantee period and affect the correct functioning of the product. Natural wear and tear does not constitute a malfunction. No legal guarantee can be offered if the fault can be attributed to third parties, unprofessional installation or commissioning, incorrect or negligent handling, improper transport, excessive loading, use of improper equipment, faulty construction work, unsuitable construction location or improper operation or use. Legal guarantee claims shall only be accepted if notification of the fault is provided immediately after it is discovered Guarantee claims are to be directed to the seller.

The seller must be informed before guarantee claims are processed. For processing a guarantee claim an exact fault description and the invoice/delivery note must be provided.

The seller can choose to fulfil the legal guarantee either by repair or replacement. If the product can neither be repaired nor replaced, or if this does not occur within a suitable period in spite of the specification of an extension period in writing by the customer, the reduction in value caused by the fault shall be replaced, or, if this is not sufficient taking the interests of the end customer into consideration, the contract is cancelled.

Any further claims against the seller based on this legal guarantee obligation, in particular claims for damages due to lost profit, loss-of-use or indirect damages are excluded, unless liability is obligatory by law.

15 Technical data

Temperature difference controller	
Rated voltage (system voltage)	230 VAC, 50 Hz [optional 115 VAC, 60 Hz]
Max. own consumption	≤ 4 W
Inputs	6 T1 - T5: temperature recording (Pt1000) T6: temperature recording (Pt1000) or pulse recording
Additional inputs	1 x Direct Sensor input (flow rate and temperature)
Outputs	3 R1 and R2: TRIAC output for RPM control, max. switching current 1.1 A AC R3: relay switched output, max. switching current 3.47 A AC
Additional outputs	1 x alarm output (⚠ - ⚠ : ⌣–), potential-free contact for SELV max. 42 V, max. 2 A
Number of pre-defined hydraulic schemes	40
Interfaces	RS232 and RS485
Ingress protection	IP 20/DIN 40050
Protection class	I
Permitted ambient temperature	0 to +45 °C
Display	animated graphic LCD with backlighting
Dimensions L x W x H [mm]	170 x 170 x 46
Software class	A
Type of action	type 1B
Type of fastening for permanently connected cables	type X
Intended transport condition	no information
Degree of pollution	2
Ball pressure test temperature	850 °C
Overvoltage category	class II (2500 V)

15.1 Performance data

Output	Power	Fuse
R1	250 W (230 VAC)/125 W (115 VAC)	Internal fuse: 2.5 A T, 250 V orT 2.5 A H 250 V (Littelfuse: 21502.5)
R2	250 W (230 VAC)/125 W (115 VAC)	
R3	800 W (230 VAC)/400 W (115 VAC)	Internal fuse: 4 A T, 250 V orT 4 A H 250 V (Littelfuse: 215004)

⚠ **DANGER**

Risk of death by electrocution!

Fuses may only be changed after disconnection from the power supply, and by trained professional personnel!

15.2   Parameter settings

Maximum temperature storage tank 1, storage tank 2 and storage tank 3:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
60 °C	0 °C	95 °C	When the maximum temperature of storage tank 1 (storage tank 2, 3) is reached, storage tank 1 (storage tank 2, 3) is not loaded until the temperature drops to 3 K below the defined maximum value.

Maximum pool temperature:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
30 °C	10 °C	45 °C	When the maximum pool temperature is reached, the swimming pool is not loaded until the temperature drops to 3 K below the defined maximum value.

Switch-on temp. difference solar 1, solar 2 and solar 3:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
8 K	Switch-off temperature difference +2 K	50 K	When the switch-on temperature difference between collector and storage tank is reached, the storage tank is loaded.

Switch-off temp. difference solar 1, solar 2 and solar 3:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
4 K	0 K	Switch-on temperature difference -2 K	When the switch-off temperature difference between collector and storage tank is reached, loading of the storage tank is stopped. The difference between the switch-on temperature difference and the switch-off temperature difference must be at least 2 K, and is barred from being set any lower.

Switch-on temperature difference external heat exchanger:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
6 K	-	-	When the switch-on temperature difference between the secondary side of the external heat exchanger and the storage tank is reached, the storage tank is loaded. This value cannot be changed.

Switch-off temperature difference external heat exchanger:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
3 K	-	-	When the switch-off temperature difference between the secondary side of the external heat exchanger and the storage tank is reached, loading of the storage tank is stopped. This value cannot be changed.

Maximum collector temperature:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
130 °C	Minimum collector temperature +20 K	180 °C	When the maximum collector temperature is reached, the solar circuit pump switches off. When the temperature drops to 3 K below the defined maximum value, the solar circuit pump switches on again.

Minimum collector temperature:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
0 °C	0 °C	Maximum collector temperature -20 K	Only when the minimum collector temperature is reached, and in consideration of the other switch-on conditions, does the solar circuit pump switch on. This value can be increased up to 20 K below the defined maximum collector temperature.

Switch-on temperature difference return increase:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
6 K	Switch-off temperature of return +2 K	50 K	When the switch-on temperature difference between storage tank temperature and heating return temperature is reached, the switching valve is activated and water flows through the storage tank.

Switch-off temperature difference return increase:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
3 K	0 K	Switch-on temperature of return -2 K	When the switch-off temperature difference between storage tank temperature and heating return temperature is reached, the switching valve returns to its initial state. The difference between the switch-on temperature difference and the switch-off temperature difference for return increase must be at least 2 K, and is barred from being set any lower.

Maximum temperature loading circuit 1, loading circuit 2:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
100 °C	Minimum loading circuit temperature +20 K	130 °C	When the temperature on the secondary side in the heat exchanger reaches 3 K below the defined maximum value, the solar circuit pump is switched off and the storage tank loading pump continues to run. When the temperature drops back down to 10 K below the maximum value, the solar pump switches on again. If the defined maximum value is nevertheless reached, the storage tank loading pump also switches off, for safety reasons. When the temperature returns to below the maximum temperature, the storage tank loading pump switches on again.

Minimum temperature loading circuit 1, loading circuit 2:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
0 °C	0 °C	Maximum temperature loading circuit -20 K	The storage tank loading pump is not switched on until the temperature on the secondary side of the heat exchanger has reached the defined minimum temperature.

Loading strategy of storage tank 1, storage tank 2 and storage tank 3:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
Temperature differential control			It is possible to choose between temperature differential loading and target temperature loading. Depending on the selected loading strategy, the controller either attempts to comply with the defined temperature difference between collector and storage tank, or to reach the defined target temperature as quickly as possible. See chapter 7.4.2 for information regarding settings.
8 K	2 K	50 K	
Target temperature control			
60 °C	0 °C	95 °C	

RPM control pump R1 and pump R2:

Factory setting	Adjustable down to min.	Adjustable up to max.	Description
50%	30%	100%	If RPM control is activated, the power at the controller's output R1 or R2 is regulated by means of full-wave packet control, according to the measured temperature values and controller settings. When RPM control is deactivated, full power is present at the controller's output R1 or R2. See chapter 7.4.3 for information regarding settings.

15.3   Parameter values for functions

Circulation:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Time controlled:			
-	00.00	23.59	Programming a time period which goes beyond midnight (24.00) is not possible.
Temperature controlled:			
Switch-on temperature:			
30 °C	0 °C	Switch-off temperature -2 K	
Switch-off temperature:			
35 °C	Switch-on temperature +2 K	95 °C	

Pulse controlled:			
Circulation time:			
2 min	1 min	10 min	
Wait time:			
10 min	0 min	60 min	

Back-up heating:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Temperature controlled:			
Switch-on temperature:			
55 °C	0 °C	Switch-off temperature -2 K	
Switch-off temperature:			
60 °C	Switch-on temperature +2 K	95 °C	
Time controlled:			
--	00.00	23.59	Programming a time period which goes beyond midnight (24.00) is not possible.

Solid fuel boiler:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Temperature controlled:			
Switch-on temperature difference:			
6 K	Switch-off temperature difference +2 K	20 K	
Switch-off temperature difference:			
3 K	0 K	Switch-on temperature difference -2 K	
Maximum heat target temperature:			
60 °C	0 °C	150 °C	
Minimum heat source temperature:			
50 °C	30 °C	95 °C	

Quick charge:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Temperature controlled:			
Switch-on temperature:			
50 °C	0 °C	95 °C	The switch-off temperature is adjusted according to the hysteresis.
Switch-off temperature:			
52 °C	Switch-on temperature 2 K	Switch-on temperature 10 K	

Heat quantity:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Pulse value for recording flow rate with a pulse generator:			
1 l/Imp	25l/Imp, 10l/Imp, 1l/Imp, 10 Imp/l, 20 Imp/l, 50 Imp/l, 100 Imp/l, 200 Imp/l, 300 Imp/l, 400 Imp/l, 500 Imp/l, 600 Imp/l, 700 Imp/l, 800 Imp/l, 900 Imp/l, 1000 Imp/l		
Recording flow rate with Grundfos sensor type (Direct Sensor):			
--	VFS 1 - 20, VFS 2 - 40, VFS 5 - 100, VFS 10 - 200		
Glycol content:			
40%	0%	60%	
Flow rate value for recording flow rate without a flow rate sensor:			
Flow rate value for maximum pump speed:			
--	0	99	The flow rate value for the maximum pump speed must be greater than the flow rate value for the minimum pump speed.
Flow rate value for minimum pump speed:			
--	0	99	The flow rate value for the maximum pump speed must be greater than the flow rate value for the minimum pump speed.

Thermostat:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Temperature controlled:			
Switch-on temperature:			
20 °C	0 °C	180 °C	The on and off values can be set independently of each other.
Switch-off temperature:			
20 °C	0 °C	180 °C	
Time controlled:			
--	00.00	23.59	Programming a time period which goes beyond midnight (24.00) is not possible.

Difference thermostat:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Temperature controlled:			
Switch-on temperature difference:			
6 K	Switch-off temperature difference +2 K	80 K	
Switch-off temperature difference:			
3 K	0 K	Switch-on temperature difference -2 K	
Maximum heat source temperature:			
100 °C	Minimum source temperature +2 K	180 °C	
Minimum heat source temperature:			
0 °C	0 °C	Maximum source temperature - 2 K	
Temperature limit heat target:			
60 °C	0 °C	95 °C	
Time controlled:			
--	00.00	23.59	Programming a time period which goes beyond midnight (24.00) is not possible.

Time function:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Time controlled:			
--	00.00	23.59	Programming a time period which goes beyond midnight (24.00) is not possible.

Interval:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Interval time:			
15 min	10 min	60 min	
Test-on time:			
5 sec.	3 sec.	30 sec.	
Time controlled:			
--	00.00	23.59	Programming a time period which goes beyond midnight (24.00) is not possible.

Holiday function/recooling:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Minimum storage tank temperature:			
35 °C	0 °C	95 °C	If possible, the storage tank is cooled down to the defined minimum temperature at night.
--	01.01.2007	31.12.2099	Programming a time period which goes beyond midnight (24.00) is not possible.

Anti-legionella function:

Factory setting	Adjustable down to min.	Adjustable up to max.	Comment
Set temperature of the daily heating:			
60 °C	60 °C	75 °C	Storage tank is heated up to the set temperature once daily.
--	00.00	23.59	The duration of the anti-legionella function can be set between 1 hour and 3 hours 59 minutes. Programming a time period which goes beyond midnight (24.00) is not possible.

16 Notes